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Shock UN report suppressed **Bangladesh condemned?**

The latest projections of Bangladesh's population are so alarming that a UN report on them appears to have been suppressed.

The report¹, sponsored by the United Nations' Relief Operation Dacca (UNROD), has been given extremely limited circulation by UNROD's chief in Dacca, Victor Umbricht, a Swiss spokesman on loan to the UN.

The report was written by Md. Ali Akbar, Lecturer at the College of Social Welfare and Research Centre, Dacca University, and David G. French, UNROD Project Adviser, who directed a task force of Bangladesh nationals drawn from Dacca University, the Ministry of Health and Family Planning, the Institute of Development Economics, and the Bangladesh Family Welfare Association. The projections were prepared by the Harvard University Centre for Population Studies.

Depending on what rate of fertility reduction can be achieved, the report states that Bangladesh's population in AD 2003 will be anywhere between 229.2 million (no reduction) and 153.3 million (drastic reduction). Estimated population this year is 74 million. But even if Bangladesh achieves replacement rate by 2000-05, and continues the same way through the next century, population will go on rising until 2070 to 234.6 million.

No country has achieved such a reduction in so short a time.

Even with a drastic reduction of fertility from 6.5TFR (Total Fertility Rate or average number of children born to each woman during her lifetime) to 2.2 TFR in 2003, urban population will grow tenfold to 55.3 million.

A

The report states, "the investment in urban infrastructure and in industrial and commercial enterprises to absorb this population in productive employment is staggering. There is a possibility of a large, chronically unemployed urban proletariat, which will pose problems of law and order and political stability unmatched by anything this country has seen in the past".

Prospects for self-sufficiency in food are not encouraging. The World Bank has estimated that with a substantial reduction in population growth (decline to 3.25 TFR by 2003), Bangladesh could be self-sufficient in food from 1980 to 1995. But, UNROD experts add:

Green Revolution is still so young that it is not yet known what longterm effects double and triple cropping will have on the productivity of the soil. Environmentalists, furthermore, are expressing concern that widespread and escalating use of insecticides may kill off the fish in Bangladesh. But even if these risks in the rapid application of new agricultural technology do not materialise, the most that can be hoped from the Green Revolution is a little more time in which to achieve a replacement level of fertility."

In 1971, there were 1,329 persons per square mile in Bangladesh, compared with 1,010 in Taiwan and 471 in India. continued on page 202

"It must be kept in mind that the

Minamata trial result

Another milestone in Japanese pollution history was passed on March 20, 1973, with the handing down of the decision for the infamous mercury poisoning case trial, Kyushu Island. After nearly four years of trial, Judge Jiro Saito of the Kumamoto District Court reached a decision which is considered to be a legal victory for the 138 plaintiffs, victims of the disease. In upholding all the major legal points of the charge, Judge Saito found the Chisso Corporation guilty of gross negligence due to mercury wastes discharged by its chemical factory in Minamata City. The firm was ordered to pay over 937 million ven (over £1.3 m) in compensation to the 30 families represented in the trial.

Judge Saito further declared that

the company operated in total disregard of the people and the environment, that preliminary studies could have foreseen the effects of mercury wastes on the human body, and thus, that adequate safety measures could have prevented the tragic results of the pollution. The court decision is significant in that, unlike earlier accused pollution cases, it the company not only of destroying the health of the people, but also of the environment.

Another important point of the trial was the nullification of the solatium agreement signed between Chisso and the patients on December 30, 1959. The contract included a clause that the recipients would not seek further continued on page 204

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Even with a drastic reduction in population growth, density will rise from 3.3 persons per acre of cultivable land to 6.8 in 2003. The UNROD team adds:

"A fundamental revision of the landholding and settlement patterns will become essential to make use of modern agricultural inputs".

As for education, UNROD states:

"The attainment of the nation's cherished goal of improved education for all its children will be difficult under the most favourable circumstances. Even with replacement level within 30 years, the number of school age children will increase almost 50 per cent between 1973 and 2003, and if school attendance goes up to include 95 per cent of the children instead of the present 35 per cent, the number in school will increase four and a half times. With no reduction in population growth, the respective increases will be three times as many school age children, and eight and a half times as many in school".

Poor family planning results

Past efforts in population planning have given poor results, due to:

- "a. dependence at grass roots level on illiterate 'dais' (midwives) and vasectomy agents who were attracted to the programme through a system of monetary incentives but mostly had no lasting commitment to the programme or to their clients;
- b. emphasis on quantitative targets encouraging reporting of inflated figures;
- c. payments on a case basis and onthe-spot cash incentives resulting in wide-scale corruption and malpractice;
- d. increase of the volume of paperwork by the cash incentive system which converted personnel whose primary responsibilities should have been supervision, motivation and education of field workers into deskbound bureaucrats;
- e. lack of co-ordination between the research and operating units resulting in failure to use research *continued on page 205*

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Halesowen sinks a smelter

On the evening of the 4th April, Halesowen Borough Council voted overwhelmingly to reject an application by BKL Alloys Ltd., a subsidiary of GKN, to construct a £1.5 million secondary aluminium smelter in the borough.

The decision followed a short but vigorous campaign started early in February by the *Black Country Bugle*, a local monthly magazine. At that time, said a spokesman for the Stop the Smelter Campaign, it looked as though the application would be allowed without any reference to the people likely to be affected by it. A large number of people would have been affected, because the proposed site is close to a residential area.

The new smelter was intended to augment an existing plant at Kings Norton, a Birmingham suburb. On visiting the Kings Norton plant, a *Bugle* reporter found evidence of fallout over a wide area. The main problem was with salt, which had severely corroded a car abandoned for several months in a nearby car park. The campaigners feared the contamination of food from gases, dust and particles. There are a number of food shops and a food processing plant close to the Halesowen site.

As the campaign accelerated, BKL took the unusual step of issuing a statement to the press giving assurances about pollution levels, which they said would meet with standards laid down by the Alkali Inspectorate, and of holding a public meeting in Halesowen swimming baths on the evening of the 2nd April, two days before the Council was to reach its decision.

The company's assurances about the environmental impact of the plant were, at best, naive. They promised that "there will be no toxic fumes or effluent" and "no fumes, dust or particles" from the plant. At the public meeting they amended this assurance by saying they would achieve a 90 per cent control of pollutant emission. There is a big difference between reducing pollution and preventing it altogether, which is impossible, and the first assurance should not have been made. Their references to effects on vegetation seem to suggest concern about fluoride emissions. They said, too, that there would be no emission of gaseous chlorine. They did not mention salt, which is the form in which their chlorine would be released, nor of carbon monoxide, carbon dioxide, sulphur dioxide or hydrocarbons, which are products of combustion.

They said the plant would be fed by 15 lorries a day, but they did not explain that with a planned annual output of 50,000 tons a year and a five day working week, which the company promise, each lorry would have to deliver at least 20 tons. The maximum axle load permitted on British roadsthe controversial juggernauts-is 32 tons. The Halesowen lorries would be very large. If each lorry were to deliver five tons, more like 60 would be needed every day. BKL said nothing about pollution caused by exhaust or noise from the lorries nor of the effect on local road traffic.

Nor did they give any assurance about the appearance of the plant, although an "artist's impression" circulated at the public meeting shows heavy cosmetic treatment, particularly of the three 150 ft and one 75 ft stacks, which seemed to disappear.

Situated on the edge of the Black Country, Halesowen prides itself on having escaped the worst of the damage inflicted by heavy industry on the West Midlands, to become an attractive residential area in a region short of attractive residential areas. The opening of the smelter would have been a retrograde step, a move back to the "dark satanic mills" which are unpopular now that people realise the environment can be improved. It is possible that BKL misjudged the local residents, who number more engineers and technologists competent to challenge their plans than they bargained for.

Opposed by the county council, it looked as though the borough council would approve the scheme. They rejected it, according to the Town Clerk, "because it would have been detrimental to the environment". Halesowen is to be congratulated on a sensible decision and the environmentalists on a victory. The war is not over yet, however. BKL announced in advance that if permission were refused they would appeal to the Department of the Environment. The protesters are preparing themselves for the public inquiry they believe will Michael Allaby follow.

"Artist's impression" of the proposed smelter. The stacks have disappeared.



Minamata continued from page 201

compensation even if it became clear that the company was responsible for the outbreak of the disease. The contract, however, was concluded after Chisso was already aware of the results of the Company doctor's experiments showing that cats fed factory wastes contracted the disease. The Judge declared that the company attempted to take advantage of the ignorance and poverty of the patients by forcing them into a contract which violated public order.

The Minamata Disease case is often cited as representative of Japanese pollution cases. Its long history includes attempts by industry to mislead the public, lack of responsible actions by local and national governments, and intense suffering and agony on the part of the victims—all of which points were duly noted in the recent court decision. The Minamata case must be recognised as one of the most tragic incidents of the post-war era in Japan.

An acetaldehyde factory was installed by Chisso in Minamata City in 1932, and increased its production greatly after World War II. There is a long history of damage to the local fishing industry, followed in 1953 by the outbreak of a strange disease in members of the Minamata fishing community. Since then, the number of patients has increased every year. Today, there are 397 recognised Minamata Disease patients, with 65 dead. An additional 498 residents of the area have submitted applications to become officially recognised patients.

The Minamata experience has several important implications. One important feature is the delay of both government and industry in directly dealing with the problem. Although a research group from Kumamoto University Medical Department reported as early as May, 1956, that Chisso's effluent dumped untreated into the bay and absorbed into the food chain were the source of the heavy metal poisoning, fishing from the bay was not officially prohibited until February, 1973. During these 17 years, residents have continued to eat the contaminated fish. Moreover, no comprehensive medical examination of residents of the entire affected area has ever been undertaken by any government group, and no efforts have been made to recover the mercury

It took the Japanese government until September, 1968, to officially announce that methylmercury compounds from the acetaldehyde process of the Chisso Corporation were responsible for the poisoning. Then, in June, 1969, the court case was initiated. Avoidance of concrete actions by Chisso and the government to help the victims or to clean up the polluted bay during the past 17 years while they waited for responsibility to be legally established has caused much unnecessary suffering and has contributed to the spread of the disease throughout the entire area. One doctor estimated the number of patients to be as high as 10,000, with the possibility of an outbreak of chronic poisoning on a large scale. In addition, Kumamoto University sources estimate there to be over 400 tons of mercury in about 600,000 tons of sludge in Minamata Bay-a colossal clean-up task and disposal problem.

The Minamata trial decision, while considered a legal victory, is only one more step in the Minamata struggle. One result of the long arduous fight is that the patients have become split into factions. Six different groups presently exist, divided along political lines and the compensation method they are seeking. One group is advocating direct negotiations with the company, while another initiated a second trial on January 31, 1973. This split among the patients themselves, and the involvement of outside interests (especially political parties) has created a very complex situation.

Effective treatment and rehabilitation facilities for the patients constitutes another problem. This involves not only physical disabilities of severely afflicted patients (contractions of visual field, perception disorder, ataxia, speech disorders, and impaired hearing), but also their everyday life situations. Many have been ostracised or subjected to prejudice from other Minamata residents because they are patients. In addition, their physical debilitations and the ban on fishing have deprived them of their livelihood. While compensation money may help pay off debts of the past 20 years and help to provide food and shelter for the next few years, it cannot erase their suffering, it does not return their health, it does not give them back an unpolluted sea and clean food supply, and it does not remove the conflict of their communities.

This, however is what the victims are now demanding. It has taken a long time, but Minamata Disease victims are finally forcing Japanese local and national administrations to deal with problems of the patients and their polluted environment. In the process, they are advancing the fight against general Japanese pollution, forcing industry and government to reflect on their obligations to society, and to reappraise the one-sided economic growth and profit oriented priorities of postwar Japan.

> Norie Huddle Michael Reich

Know a tree in '73

There is more to Tree Year than simply planting and felling trees. A part of the aim is (or should be) to increase the individual's understanding and awareness of the trees in his or her neighbourhood. To this end the Conservation Trust has produced a kit for schools which may be of greater long-term significance than any number of random plantings (or fellings).

The object of the kit is to give children a method of study. Rather than produce a list of species, which inevitably is either incomplete or unwieldy or both, it takes one tree, the ash, describes its appearance in each season of the year and then goes on to

suggest projects. Children are encouraged to measure trees, to study the ecosystems of which they are part, to discover the economic uses for the timber and to look for historical and literary allusions to the tree. Then, when that tree has been explored, the student can move on to other species, following the same method. The concept is admirable, could be adapted easily to other features of the environment and is flexible enough to be modified without losing any of its usefulness.

The kit is obtainable from The Conservation Trust, 21 Hanyards Lane, Cuffley, Potters Bar, Herts. EN6 4AT. Bangladesh continued from page 202

findings to adjust and reorganise the programme."

Long term action

The experts' recommendation for long term action are way beyond anything any government has yet dared decree:

- 30 years should be the outside limit for reaching replacement level.
- Serious consideration should be given to mandatory limitation of family size if voluntary limitation doesn't work fast enough.
- Abortions should be provided free and permitted on grounds of "contraceptive failure".
- A Ministry of Population Affairs should be established as the most effective way of giving top priority to population control, as high as that given to food production.
- Free contraceptives should be provided to all 15 million married couples in Bangladesh in which the woman is of child-bearing age.
- A mass education programme should be mounted using newspapers, magazines, radio, TV, regular schools and colleges, the Army, Trade Unions.
- Test programmes should be initiated to discover indirect means of bringing down family size, e.g. longer education and new job opportunities for women, raising the age of marriage, better health care and nutrition for children, electric power in rural areas.

The report concludes that Bangladesh is already at the point which most other rapidly growing countries will be approaching in only a generation.

"We do not know whether enforced family limitation measures would be widely enough accepted in Bangladesh to make such a policy feasible. Furthermore the medical service system which would be required using present technology, is not yet developed. It is unfortunate that the major international voluntary as well as governmentally supported organisations working in the field of population are not dealing directly with the issues and techniques for mandatory limitation of family size."

Vanya Walker-Leigh

Editorial comment on page 207.

(1) Some Social Aspects of Development Planning in Bangladesh, Vol. I. Population Planning. UNROD, Dacca, Bangladesh, December, 1972. Roneo.

Larzac occupied

The French Army is to take over 103 farms on the Larzac, one of France's most beautiful areas. An official enquiry has just declared that its plan to add 35,000 acres to the 7,000 acre military camp already existing in the middle of this mysterious landscape is in the "public interest".

The Larzac is part of the Grande Causses, a dramatic region of dry permeable limestone plateaux, dissected by the deep gorges of the Tarn, Jonte and other rivers. The *causses* are rich in remarkable caverns, underground rivers and rock outcrops.

The existing camp is hired out to NATO forces for training. From time to time holidaymakers have been surprised to glimpse British uniforms on the roads around Millau, and last year some local militants threw a Molotov cocktail at a Land Rover. They claimed that the British Army was training for Ulster on the Larzac.

It is said by opponents of the Camp that there are other, sinister reasons for the extension. Complicated natural cave systems run under the Larzac, and whatever the French Army plans to do down there would be well protected against nuclear attack. They have been using infra-red air photography to plot these caves. There are rumours locally of strange explosions under the ground, and some cave entrances, outside the existing camp perimiter, are now ringed by barbed wire and patrolled by dogs.

When Defence Minister Michel Debré recently dismissed the Larzac as an empty heap of stones, he rubbed salt in the wounds caused by the evacuation of the countryside and the destruction of a traditional way of life; and he showed himself ignorant of the fact that some sort of equilibrium still exists on the *causses* between settlement and a difficult environment.

Debré claimed the extension will not have a drastic effect. The peasants are sceptical. The Army promised the 120,000 acres camp they set up at Canjures in Provence in the 1960s would not badly distort that area: but it has virtually cut Haut-Var in two.



View of Larzac near Roquefort

Jacques Duhamel, Minister of Culture, has just had to sack M. Louis Balsan, Keeper of Antiquities for the Aveyron, for "lack of proper tact" because he implied publicly that Debré's intrusions into the affair had been faintly ludicrous. Monsieur Balsan, who has been studying the *causses* all his life, believes the Larzac is a perfect ecological system with man and nature working harmoniously together. He thinks that the plateau is the key to water drainage in the Midi and that Army interference will be ecologically disastrous.

A cold war is now going on between the Larzac farmers and the Army. The peasants have resorted to the tactic of selling off bits of land at 0.40 francs per square metre to sympathisers to make compulsory take-over more complicated.

So far their resistance has been basically non-violent. Lanza del Vasto, the well-known pacifist, has been a strong influence on them. But they say they are quite willing to be martyrs if the fatal eviction day comes. However, they hope the strength of public opinion will force the Army (who after all already control 580,000 acres of France) to back down even now.



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Comment

Who's afraid of aid?

The UNROD report on Bangladesh's future population (see page 201) has been given such an unusually restricted circulation that it might as well have been suppressed. Indeed, it looks as if it was. Why? There are six possible reasons. First, to avoid alarming the public; second, to maintain political stability; third, to preserve the morale of relief workers; fourth, to avoid embarrassing India; fifth, to prevent any reappraisal of the assumptions underlying current trade and aid programmes; sixth, to postpone any wider consideration of the implications for other countries.

All of them probably carried weight —although had wiser council prevailed the last two would have been taken as excellent reasons for giving the report as wide a circulation as possible.

If current trade and aid programmes are unable to ensure that the more optimistic population projections will be achieved, and if they are unable to provide even for these populations, then surely it is time we asked who benefits from them? Plainly, it is not the people of Bangladesh (except perhaps for the wealthier landlords and entrepreneurs).

Such programmes are the target for more and more criticism, largely from the non-industrial countries themselves. Speaking at a recent conference organised by the Ecumenical Institute of the World Council of Churches, Dr C. T. Kurien, professor of economics at Madras Christian College, said that after planning for development for 25 years, India finds itself with half its population living below subsistence level, in poverty quite unprecedented in the country's history. A Ghanaian scientist declared that often the terms on which aid is offered make its acceptance all but impossible.

Development, not growth

This point is enlarged upon by Samir Amin, Director of the African Institute for Economic Development and

Planning, Dakar, Senegal, in the April issue of Development Forum. He argues that the aid policy of the West is one that interprets development as growth, simply because it is in its interest to do so. "Stabilisation of raw material prices, with buffer stocks to narrow price fluctuations, the promotion of a few 'import substitution' industries, the attainment of certain quantitative aid goals, and of course the encouragement of foreign investment, particularly that of the multinational corporations, are all designed to achieve growth". But it is a growth which perpetuates an imbalance in which "the industrialised nations . . . concentrate on high technology and a high return on manufactured products, while the developing countries ... concentrate on raw materials production and some light manufacturing".

By confining the economic role of the non-industrial countries to acting as suppliers of cheap materials and (for multinational corporations) cheap labour and as a limited, though growing, market for technology, the rich nations benefit rather more than do the poor.

Preserving the status quo

Unfortunately, a large contingent within the UN seems anxious to preserve this relationship. In the same issue of Development Forum, there is an unsigned article called "Down with Limits to Growth". Its main objection to the argument that the world's resources should be conserved and recycled is that this would damage the poor suppliers: "Entire countries count on the proceeds of minerals exports to provide them with the bulk of their foreign exchange. These are mostly among the poorer nations whose development plans would be damaged severely if the world were to go on a minerals conservation spree".

The article goes on to quote an unpublished study by John Carman, technical advisor of the UN's Resources and Transport Division, which criticises the idea of resource scarcity largely on the grounds that it overlooks both the immense quantities of ores in the earth's crust and the beneficial effect of market forces.

These claims have very little validity. It is all very well to recite that there are some 620,000 tons of copper, 900,000 tons of nickel, almost a billion tons of aluminium, and so on, in a cubic mile of rock. This ignores the ecological disruption caused by disposal of the even greater quantities of waste materials, the sharp drop in ore quality beyond a certain point, and the unavoidable thermal pollution from the vast amounts of energy needed to extract and process the ores.

It is also highly disingenuous to talk of the value to non-industrial countries of minerals exports or of the beneficial effects of market forces. The undeveloped supplier countries benefit very little from the relationship, a situation recognised by those of us who suggest that resources are scarce in relation to future demand. For we argue not merely that the industrial nations should conserve and recycle these resources but also that they should pay the supplier countries a fair price for them. The current prices of metals and fuels reflect short term market forces and not their real value. This is inevitable, since the market place is not the neutral forum for the resolution of competing resource demands that some economists claim it is. As an integral part of the existing socio-economic system it will simply express and perpetuate that system's flaws and inequities.

Growth's Catch 22

Most seriously, such talk glosses over growth's biggest Catch 22 of them all: The undeveloped suppliers must sell their raw materials to the developed consumers, so that they too may develop. They have to sell them cheaply because the raw materials are currently in good supply. As the supply diminishes, the price goes up. This does not bother the developed countries since they have the capital to go on paying for them, and anyway they just pass on the increased cost in the prices of the manufactures sold to the undeveloped countries. As the undeveloped suppliers begin to develop, so the raw materials needed for this development diminish still more quickly and their prices rise more sharply. At a certain point, the prices rise high enough to induce the developed countries to substitute other metals or synthesise alternative materials. The undeveloped suppliers find themselves unable to develop further since

- (a) their own stock of raw materials has been depleted;
- (b) they cannot sell the materials they have left;
- (c) they cannot afford the materials they lack.

The attitude of the industrial to the non-industrial countries thus might be summed up by Allen's law of supply and demand: "I demand, you supply." Understandably, there is resistance to documents like *The Limits to Growth* and *A Blueprint for Survival*, which question the moral basis of such an arrangement. It is saddening to see some of it coming from within the UN.

The industrial nations and those UN pipers whose tune they call might make up their minds on the purpose of their trade and aid programmes. Is it to salve their consciences, to hinder their non-industrial fellows, or to help them?

If it is to help them, then it is time a serious attempt was made to do so. We in the rich countries must come to terms with our finite world and recognise our obligation to share its resources. Let there be an end to the smokescreen of petulance over the limits to growth. And let us face squarely situations like that in Bangladesh, however disturbing they may be.

What future for Bangladesh?

The future of Bangladesh may well be hopeless. But hopeless situations are not averted or made any the easier by our not discussing them. It should be made clear that there is no middle ground between doing everything possible to help the people of Bangladesh, and consigning them to their fate. In other words, not doing everything for them is tantamount to doing nothing. If it is felt that nothing can be done for them, then all aid should be withdrawn, since it could be better spent elsewhere. If, on the other hand, it is felt that something can be done for them, then the current aid programme is grossly inadequate.

In our view, if Bangladesh is to be saved, it needs:

1. A population programme. The recommendations of the UNROD report under the heading "Long term action" (meaning immediate action with long term results) should be adopted. Mandatory action, however, will probably be thought even more unpleasant than the consequences of

permitting continued population growth, in which case it should not be taken. Instead what is needed is an understanding of the cultural and economic stimuli most likely to persuade couples voluntarily to limit their families. Little cross-cultural research has been done on this, yet it is a still more vital subject for investigation than contraceptive technology. The object of the population programme should be initially to halt growth, and then to reduce the population to a sustainable level. Immediate studies should be initiated to determine what the level is, on the basis of a realistic agricultural policy.

2. Money. A great deal of money will be needed, probably for as long as 200 years, so that food can be bought on the world market. It is essential the agricultural ecology of that Bangladesh be not strained beyond endurance in a vain attempt to support the growing population. It is equally essential that aid be not provided in the form of food, since this would destroy the agricultural economy. The balance of trade is critically important. The country's main export is jute, which until recently secured for it a comparative advantage in international trade. The effect of this was ecologically beneficial since under the then prevailing terms of trade Bangladesh could earn more food from jute sales than it could grow on the same area of land directly as food. This alternative is closing as the jute market declines due to the industrial countries' substitution of containers and polythene packaging: the former causing them unemployment and traffic troubles (juggernauts, dockland unemployment, etc.), the latter unrecycled and non-biodegradable waste! Clearly, it would greatly benefit Bangladesh (and incidentally us) if its jute market were guaranteed. However, this is unlikely to be enough, and in addition the industrial countries will have to give sufficient funds to make up any short-fall. Unfortunately, this would cause insuperable balance of payment problems-unless the international monetary system were reformed. Problems such as these of the non-industrial countries provide a pressing enough reason for this to be done.

3. A sustainable agriculture. The heart of any ecologically sound economy, particularly a developing one, must be food production. Bangladesh needs ecological research and training

so that an optimally productive farming system may be developed.

4. Training. The future of Bangladesh, and indeed of all non-industrial countries, can be assured only partially by the fostering of export markets and hardly at all by the purchase of industrial technologies. Priority should be given instead to the development of a healthy home economy, which would encourage rather than destroy the continued vitality of existing cultures and communities. For this training is more important than capital or machines-training in those techniques which the people of Bangladesh feel they could usefully adapt to their particular needs. This does not mean "experts" going to Bangladesh, but representatives of Bangladesh coming to industrial countries, since they alone can decide those aspects of a subject that are appropriate for their country.

These proposals, of course, are not intended to be in any way comprehensive. Their object is to demonstrate that if we in the rich countries are serious about helping the poor, it will involve considerable sacrifice with virtually no chance of a return. We cannot avoid the choice between action on this scale, and allowing Bangladesh to go under.

Here we might bear in mind that the predicament in which Bangladesh now finds itself is very largely of our making. It is the result of the familiar pattern of the destruction of indigenous cultures by Western expansionism (mercantile and missionary) followed by medicine - robber interventionist thoughtlessness followed by liberal thoughtlessness. We are therefore morally obliged to do our utmost to help Bangladesh. That-with all our capital and resources-we are most unlikely to do so is simply an indication that our civilisation is delinquent.

Perhaps these are the reasons why UNROD's report was suppressed. If so, then Mr Umbricht and whoever else was party to his action has done a grave dis-service not only to Bangladesh but to all other fast growing countries. For if we are prevented from considering and discussing their situation in full knowledge of the facts, how can we take appropriate action? How can we reform our trade and aid programmes? How can we forestall yet other Bangladeshs?

Robert Allen and Michael Allaby

Gremlin

That fish again

The fish which is reputed to live in the Thames may be in trouble. According to the March, 1973, number of Marine Pollution Bulletin, "Britain's attempts to clean up the Thames were severely handicapped in January by a strike of the crews of five sewage boats belonging to the Greater London Council which normally dump 13,000 tons of sludge a day into the North Sea, 50 miles from land". We wondered how the miracle clean-up had been achieved. The strike over, Londoners have resumed their low-impact angling, but not for long. The same issue also reports that "A concerted attack on pollution in the North Sea may follow a meeting convened by the World Health Organisation . . ."

Garbage conservation

David Bellamy, the botanist turned TV star, led his intrepid crew into the heart of Sunderland Corporation's refuse tip on March 28 in order to make a film on natural history. The tip has been declared a Site of Special Scientific Interest and there are plans to turn it into a nature reserve.

There is no truth in rumours that similar plans exist for the Port of London (home of the fox, but of no Special Interest) Paddington Station (from which the horse disappeared some years ago) or Clapham Common.

Gremlin in cyber-dole threat probe

Last Christmas the white- and stripeycollared of the dole queue, having been declared *de trop* at their desks, were offered some quantitative analysis of their plight. The Department of Employment's study, *Computers in Offices*, appeared, concluding that computers have destroyed 160,000 British office jobs, and "deskilled" many more. By 1979 they would be doing the work of 670,000 with a staff of only 270,000.

The recent news that unemployment benefits for Scotland and Northern England are to be handled by a central computer at Livingstone New Town is thus an obvious sign that rearguard action is being attempted by the Department to make good 1973's marginal losses in the numbers out of work.

Upon contacting the Department, Gremlin's enquiries were met with a metallic voice intoning: "the standard of living... The promotion of increased economic growth through enhanced productivity and elimination of human error will raise the standard of living... whirr... click."

Environmental firsts

At last! After the world's first environmental airport comes the Burmah Oil Company with, they claim, the v/orld's first environmental head office. It's at Swindon, and the buildings on the 60 acre site are so environmental that they have to be screened by 59 ft. trees.

Environmentalism is too dangerous to be exposed to public view, which is why the oil companies are working on a seaweed to disguise the world's first environmental oilrig, and why the Government invented the Department of the Environment to fluff the world's first environmental policies.

Breast conservation

Playtex, the bra-makers, are marketing what they describe as "the most dramatic advance in baby feeding in over a century". They call it the "Playtex Nurser".

No, it is not a matching bra and breast set. It is a baby's milk bottle with a teat made out of one of those exciting new petroleum by-products but looking exactly like a nipple, of the sort customarily supplied with those boring old-fashioned breasts.

As Playtex say in their brochure, "every woman knows that breastfeeding is one of the most rewarding experiences she and her baby can have". The trouble is fewer and fewer women are prepared to risk the serious loss of uplift that could occur if they removed their breasts from their Playtex bra. Now they need do so no longer. "Mothers", say Playtex, "have found that the Playtex Nurser gives their babies many of the natural benefits—physical and emotional—of breast-feeding".

This does not include breast milk, of course. But breast milk is nasty bestial stuff. Furthermore, as Dr Idi Amino-Acid of the Pyke Advanced Institute of Scientific Nutrition never fails to point out, breast milk is not the best food for growing infants. "At this most critical stage in their development", he has said, "children need a milk formula based on the most rigorous scientific principles. Formerly, breast milk may have been satisfactory, but in the age of nuclear power and lunar exploration we deserve better. Now we can do without evolution, because we have progress instead".

The dangers of vegetation

A disgraceful thing has happened.

Industry in the area served by the Woking and District Water Company had to be closed for two days because its water supply was cut off.

The British Aircraft Corporation factory at Weybridge, Surrey, had to send home its seven thousand workers.

The factory makes parts for Concorde, our pride and joy, our symbol of technological omnipotence.

Yet the water supply was cut off. And for why? Because algae clogged the filter system at the Walton-on-Thames pumping Station.

Why hasn't the Woking and District Water Company been severely punished for his negligence? Think of it: Concorde halted by a weed. I wouldn't be surprised to find that the chap in charge of the Woking and District Water Company is one of those ecology fanatics. He probably refused to get rid of the algae.

Preach what you practise

"It would be wrong at present to recommend civil engineers not to participate in projects they may not approve of on environmental grounds". That's the considered opinion of the Institution of Civil Engineers' external affairs committee. Civil engineers should "have regard for" the environment but they should throw themselves whole-heartedly into developments that would destroy it.

TYES, I am pointing at you

I notice with distaste the emergence of creeping socialism in the pages to our left. Surely, Messrs Allen and Allaby realise that the environmental movement must remain strictly apolitical. What matters is survival, not metaphysical notions of social justice. They'll be talking about redistribution next. And you know what that means: loss of the *New Statesman's* valuable support.

The Comedy of Survival

by Joseph W. Meeker

Western civilisation bases itself upon values that belong in the tragic tradition of literature. Western man likes to see himself as a hero, suffering and perhaps dying for his ideals as he meets nature head-on. Prof. Meeker argues that the comic tradition is more appropriate now that man must learn to live in harmony with his environment. Comus, the Greek demigod after whom comedy was named, concerned himself with fertility, the general success of family and community life, maintaining equilibrium among living things and restoring it once it had been lost.

Joseph W. Meeker is a professor of comparative literature and a visiting lecturer in environmental studies at the University of California at Santa Cruz. "The Comedy of Survival" is an abridged version of the title chapter from his recent book about the significance of contemporary ecology to the study of literature. It first appeared in North American Review, 257, 2, Summer, 1972.



"The only good hero is a dead hero" Act II Sc. 1 The Imbeciles by Aristophanes

Literature seems relatively guiltless of ecological crisis. Though engineers may exploit nature, poets have generally preferred to praise its beauties or to interpret its edifying moral lessons. Whatever errors we may have committed with our technology, we can at least take pride in our humanistic literary tradition which has consistently reminded us that man does not live by bread and bulldozers alone, but must give thought to goodness, truth and beauty—all of which seem ecologically safe.

If literature reflects the beliefs and behaviour of human beings, however, it must include those beliefs which have led us to use human power in ecologically destructive ways. The tragic tradition in western literature glorifies those human attitudes which have contributed to our estrangement from the natural environment, just as the comic tradition offers an image of the human animal adapting to the world around it. A moment's reflection on these two literary traditions is worthwhile for the light that may be shed upon the cultural roots of environmental crisis and upon alternatives literature offers to our selfdestruction and our destruction of nature.

Tragic literature presents an image of mankind in a state of conflict with powers that are greater than man. Such forces as nature, the gods, moral law, passionate love, the greatness of ideas and knowledge all seem enormously above mankind and in some way determine human welfare or suffering. Tragic literature demonstrates that man is equal or superior to his conflict. The tragic man affirms his mastery and his greatness in the face of his own destruction. He is a triumphant image of what man can be. Aside from the Greeks and a few Elizabethans, such images have rarely appeared before us in a convincing manner.

Comedy, on the other hand, appears wherever human culture exists. Comedy can be universal because it does not depend upon particular ideologies or metaphysical systems, but grows from the biological circumstances of life. Comedy is truly amoral in that it has, literally, "no use" for morality—that is, moral insights play no essential role in the comic experience. Similarly, comedy avoids strong emotions. Passionate love, hate, or patriotism generally appear ridiculous in a comic context, for comedy creates a psychological mood which is incompatible with deep emotions. Great ideas and ideals also seem unimportant from the comic perspective; when noble idealism does appear in comedy, its vehicle is commonly a Tartuffe or a Malvolio whose nobility turns out to be merely a sham intended to conceal selfish or ignoble motives. The comic view of man demonstrates that men behave irrationally, committing follies which reveal their essential ignorance and ridiculousness in relation to "civilised" systems of ethical and social behaviour.

Many therefore argue that comedy is basically depressing and pessimistic, while tragedy is optimistic in that it shows man's potential strength and greatness. Perhaps so, providing we believe that the morality which encourages man to rise above his natural environment and his animal origins is humanity's best hope for progress and survival. That proposition, however, is seriously in doubt in our time. We have good reasons to suspect the wisdom of our inherited traditions of metaphysical idealism. Philosophy since Nietzsche has catalogued the poverty of humanistic idealism, evolutionary biology has demonstrated the animality of mankind, contemporary psychology has shown that the mind is guided by many forces stronger than great ideas, our political philosophies fail daily to meet our simplest needs, and now the environmental crisis raises the possibility that the world itself and all its creatures are in jeopardy because we have thought too highly of ourselves. The tragic view of man, for all its flattering optimism, has led to cultural and biological disasters, and it is time we looked for alternatives which might encourage better the survival of our own and other species.

Comic strategy

Comedy demonstrates that man is durable even though he may be weak, stupid, and undignified. As the tragic hero suffers or dies for his ideals, the comic hero survives without them. At the end of his tale he manages to marry his girl, evade his enemies, slip by the oppressive authorities, avoid drastic punishment, and to stay alive. His victories are all small, but he lives in a world where only small victories are possible. His career demonstrates that weakness is a common condition of mankind that must be lived with, not one worth dying for. Comedy is careless of morality, goodness, truth, beauty, heroism, and all such abstract values men say they live by. Its only concern is to affirm man's capacity for survival and to celebrate the continuity of life itself, despite all moralities. Comedy is a celebration, a ritual renewal of biological welfare as it persists in spite of the reasons there may be for metaphysical despair.

The Greek demigod Comus, whose name we probably have to thank for the origin of the word comedy, was a god of fertility in the largest sense. His concerns included not only ordinary sexual fertility of plants, men, and animals, but also the general success of family and community life insofar as these depend upon biological processes. Comus was content to leave matters of great intellectual import to Apollo and gigantic passions to Dionysus while he busied himself with the maintenance of the commonplace conditions that are friendly to life. Maintaining equilibrium among living things, or restoring it once it has been lost, are Comus' special talents, and they are shared by the many comic heroes who follow the god's example. Literary comedy depicts the loss of equilibrium and its recovery. Wherever the normal processes of life are obstructed unnecessarily, the comic mode seeks to return to normal. Comedy pretends only to show how mankind can hold its own and survive in a world where both real and artificial threats to survival abound. Comedy muddles through, but seems to care little for such weighty matters as progress and perfection.

Those who are disposed in favour of heroism and idealistic ethics may argue that comedy is trivial because of its insistence that the commonplace is worth maintaining. The comic response is that man's high moral ideals and glorified heroic poses are themselves largely based upon fantasy, and are likely to lead to misery or death for those who hold them. As comedy sees it, the important thing is to live and to encourage life even though it is probably meaningless to do so. If the survival of our species is trivial, then so is comedy.

Comic biology

If comedy is essentially biological, is it possible that biology is also comic? Probably so. Some animal ethologists argue that humour is not only a deterrent to aggression, but an essential ingredient in the formation of intraspecific bonds, and it may have

Industrial hero: "Please dump your waste in an Area of Outstanding Natural Beauty





Fully armed agricultural hero eliminating pests, soil bacteria, wildlife and human consumers all in one easy operation

a phylogenetic basis in many animals as well as in man. Ecological structures in nature also seem to reveal organisational principles and processes which closely resemble the patterns found in comedy. Productive and stable ecosystems are those which minimise destructive encourage aggression, maximum diversity, and seek to establish equilibrium among their participants much as literary comedy does. Biological evolution itself shows all the flexibility of comic drama, and little of the monolithic passion peculiar to tragedy.

Nothing succeeds like succession

Ecology is to a large extent the study of plant and animal succession. Ecologists, seek to understand the interactions among species over long periods of time which produce the various biological communities and environments found in the natural world. At an early stage in any given environment, pioneering or invading species dominate the scene. These are highly generalised, flexible, and adaptable creatures capable of surviving despite the inhospitable nature of their environment. Pioneers must be aggressive, competitive and tough. On an evolutionary time scale, their careers are brief but dramatic episodes, but they make possible the more stable ecosystems which follow them.

Ecological pioneering species, like human pioneers, are creatures capable of living without some of the normal needs felt by others of their kind. They are heroic individuals who make their homes where no one else wants to live, and their lives lead the way toward challenging and dangerous horizons. They risk death in order to conquer new territory, and their survival depends upon their individual qualities of strength, aggressiveness, and often their ruthlessness. Pioneer species are the loners of the natural world, the tragic heroes who sacrifice themselves in satisfaction of mysterious inner commands which they alone can hear.

The process of ecological succession begun by the pioneer species, if left alone, leads toward a mature ecosystem, often called a "climax". Climax communities of plants and animals are usually extremely diverse and complicated groupings of living things which exist in a relatively balanced state with one another and with their non-living environment. Most climax ecosystems are much more complicated affairs than any human social organisation, if only because they integrate the diverse needs and activities of a very large number of different species. Human social systems have only one animal to deal with, man, plus minor adjustments to keep alive the few domesticated plants and animals enslaved to man. But a natural climax accommodates not only the complete life of every species within it, but also provides for relatively harmonious relationships among all its constituent species. The diversity of a climax ecosystem is one of the secrets of its durability.

It is a long time since men have known what it means to live in a climax ecosystem, at least since the emergence of consciousness which has made man man. For the last ten thousand years we have generally acted the role of the pioneer species,

dedicating ourselves to survival through the destruction of all our competitors and to achieving effective dominance over other forms of life. Western civilisation, at least, has developed as a tragedy does, through the actions of pioneering leaders who break new ground and surmount huge obstacles. Religion and philosophy have usually affirmed the pioneer's faith that only our own kind really counts, and that we have a right-perhaps even an obligation-to destroy or subjugate whatever seems to obstruct us. Some of our more benevolent societies have provided for wide diversification among men, but none has extended e pluribus unum to include other species.

Cosmopolitan ecology

Like comedy, mature ecosystems are cosmopolitan. Whatever may exist has an equal right to exist, and no individual prejudices or passions are sufficient cause to threaten the welfare of the structure as a whole. Necessity, of course, is real. All must eat and in turn be eaten, storms must come and go, and injustices must occur when so many rightful claimants contend. But that is just the point: comedy and ecology are systems designed to accommodate necessity and to encourage acceptance of it, while tragedy seeks to avoid or to transcend the necessary in order to accomplish the impossible.

Because they cannot choose as broadly as we, other animals have more successfully maintained the behavioural patterns which make their own survival possible while contributing to the long-term maintenance of their environments. The recent growth of ethology, the study of animal behaviour, is a sign that we are beginning to see animals as significant sources of information about living well. The ancient prejudice that animal behaviour is merely a simplified form of human behaviour is no longer tenable, for ethologists have consistently discovered that even the simplest of creatures follow exceedingly complicated and often highly sophisticated patterns of behaviour, many of which continue to defy human understanding. The rituals of reproduction and rearing, the defence of territory, the maintenance of social systems, nestbuilding, migrations, systems of foodgathering are animal activities quite

as intricate as our own systems for doing the same things. The simplest migratory bird has a guidance system that is more subtle and far more reliable than our most sophisticated ICBM, and any pair of whooping cranes has a courtship and sex life at least as complicated as Romeo and Juliet's. We are slowly beginning to realise that we have grossly underestimated the animals.

Civilised monocultures

The truth may be that civilised human life is much simpler than most animal life. We seem to have used our enlarged brain in order to reduce the number of choices facing us, and we have sought the simple way of destroying or ignoring our competition rather than the more demanding task of accommodating ourselves to the forces that surround us. We establish artificial polarities like good and evil, truth and falsehood, pain and pleasure, and demand that a choice be made which will elevate one and destroy the other. We transform complicated environments into ecologically simple farmlands. We seek unity and fear diversity. We demand that one species, our own, unchallenged achieve dominance where hundreds of species lived in complex equilibrium before our arrival. In our present environmental dilemma, we stand like a pioneer species facing heriocally the consequences of our own tragic behaviour, and we have much need to learn from the more stable comic heroes of nature, the animals.

maintain their existence. Like comedy, evolution is a matter of muddling through.

Literary comedy and biological evolution share in common the view that all change is conservative. Organisms and comic heroes change their structure or behaviour only in order to preserve an accustomed way of life which has been threatened by changes in the environment. The fish that developed lungs when his home in the sea became untenable was not a radical revolutionary, but a public-spirited preserver of his genetic heritage. The famous peppered moth of Birmingham who changed his colour from light grey to black when smoke from the industrial revolution discoloured the bark on his native trees may have denied thousands of years of moth tradition, but his adaptation made it possible to preserve moth existence. If there were moral philosophers among the fishes and moths, these innovations would very likely have been condemned as threats to the continuity of tradition, or perhaps as shameful immorality. All admiration would no doubt have been reserved for the heroic fish who would rather die than eschew gills and the moth who nobly faced his end wearing customary grey. Fossilised remains attest to the many extinct animals who insisted upon the propriety of their traditions in the face of a changing world. Whatever may threaten the continuity of life itself is expendable and subject to modification by evolution, whether it be gills or social

rituals. To evolution and to comedy, nothing is sacred but life itself.

Comic and tragic models

Oscar Wilde observed that life imitates art at least as much as art imitates life. Artists and thinkers create images of what life might be like and so provide models for human behaviour which men may imitate. Don Quixote was not born a knighterrant, but discovered his profession by reading tales of adventure. Like him, we can choose to some extent the roles we wish to play from among the many models preserved by our literature and cultural traditions.

Generally we have preferred to imitate the tragic mode, perhaps because it satisfies our vanity and makes our actions seems important. It is gratifying to think of oneself as a hero, a great sufferer, a martyr, or an oppressed idealist. Oedipus and Hamlet might not have kept our attention all these centuries if they had not offered illustrious images showing us how to bear pain magnificently. But the tragic heroes preserved in literature are the products of philosophical beliefs which most of us cannot honestly share, any more than Don Quixote could live up to the requirements of medieval chivalry while living in Renaissance Spain. A post-Freudian world no longer sees incest as an offence against the universe as Oedipus did, nor can we share Hamlet's view that revenge will give peace to the ghost of his slain father. The philosophical props and settings

Muddling through

Tragedy demands that choices be made among alternatives; comedy assumes that all choice is likely to be in error and that survival depends upon finding accommodations which will permit all parties to endure. Evolution itself is a gigantic comic drama, not the bloody tragic spectacle imagined by the sentimental humanists of early Darwinism. Nature is not "red in tooth and claw" as Tennyson would have it, for evolution does not proceed through battles fought among animals to see who is fit enough to survive and who is not. Rather, the evolutionary process is one of adaptation and accommodation, with the various species exploring opportunistically their environments in search of a means to

Industrial heroes engaged in the ceaseless battle to push back the frontiers of man's domain





Military 1st class (or ecocidal maniac) creating a country fit for the halt, the lame and the blind to live in

for genuine tragic experience have disappeared in recent centuries. We can pretend to tragic heroism, but our pretence is painfully hollow and melodramatic without the beliefs that tragedy depends upon.

Prerequisite to tragedy is the belief that the universe cares about the lives of human beings. There must be a faith that some superior order exists. and that man will be punished if he transgresses against it. It matters little whether this principle takes the form of fate, the gods, or impersonal moral law, for all are symbols of the world's interest in human actions. Corollary to this is the assumption that man is essentially superior to animal, vegetable, and mineral nature and is destined to exercise mastery over all natural processes. The most respected tragedy further assumes that some Truth exists in the universe which is more valuable than life itself. There must be abstract ideas and values which are worth dying and suffering for, or else the hero's painful quest for spiritual purity and enlightenment becomes ludicrous and absurd.

Absurd is the proper adjective to describe these assumptions, in the rather technical sense in which existential philosophy uses the term. The world has never cared about mankind, nature has never shown itself inferior to humanity, and truth has never been revealed in its awesome majesty except perhaps in the creations of tragic literature. Tragedy does not imitate the conditions of life, but creates conditions which men mimic in their attempts to attain the flattering illusions of dignity and honour. In an age which perceives dignity, honour, truth, law, and the gods as the inventions of egocentric man and not as given facts of the universe, tragedy can only parody itself.

More appropriate to our time are the relatively modest assumptions made by the comic spirit. Man is a part of nature and subject to all natural limitations and flaws. Morality is a matter of getting along with one's fellow creatures as well as possible. All beliefs are provisional, and subject to change when they fail to produce harmonious consequences. Life itself is the most important force there is: the proper study of mankind is survival. When the existence of many species, including our own, and the continuity of the biological environment are threatened as they are now, we can no longer afford the wasteful and destructive luxuries of a tragic view of life.

As patterns of behaviour, both tragedy and comedy are strategies for the resolution of conflicts. From the tragic perspective, the world is a battleground where good and evil, man and nature, truth and falsehood make war, each with the goal of destroying its polar opposite. Warfare is the basic metaphor of tragedy, and its strategy is a battle plan designed to eliminate the enemy. That is why tragedy ends with a funeral or its equivalent. Comic strategy, on the other hand, sees life as a game. Its basic metaphors are sporting events and courtship of lovers, and its conclusion is a wedding rather than a funeral. When faced with polar opposites, the problem of comedy is always how to resolve conflict without destroying the participants. Comedy is the art accommodation and of reconciliation.

Though the comic/ecological view of life may be modest and unheroic, it is anything but simple. Some superrationalists like Ayn Rand reject the current interest in ecology by arguing that a "return to nature" (à la Rousseau) would be a denial of the mental capacities of mankind, as well as being impossible in a world as complicated and populous as ours. Their assumption that nature is simple while civilisation is complex is one of the sad legacies of romantic thought. Post-Renaissance philosophy has taught us to think of nature either as an idyll of simplicity and peace populated by noble savages (Rousseau and most romanticism) or as a bloody battlefield where only the most brutal can survive (Hobbes and nineteenthcentury social Darwinism). Both views drastically oversimplify the intricate

processes of nature.

If a "return to nature" were to be based upon the model of a mature ecosystem, civilisation would have to become far more complex than anything man has yet produced. Our values could no longer assume that man is at the centre of creation, but would have to provide also for the welfare of all the plants, animals, and land of our environment. Man would have to cultivate a new and more elaborate mentality capable of understanding intricate processes without destroying them. Ecology challenges us to vigorous complexity, not passive simplicity.

If the lesson of ecology is balance and equilibrium, the lesson of comedy is humility and endurance. The comic mode of human behaviour that we find in literature is the closest we have come to describing man as an adaptive animal. Comedy illustrates that survival depends upon our ability to change ourselves rather than our environment, and upon our ability to accept our limitations rather than to curse fate for limiting us. It is a strategy for living which agrees well with the demands of ecological wisdom, and we can no longer afford to ignore it as a model for our behaviour if we hope to keep a place for our species among the other animals who live according to the comic mode.



Technical hero, or Don Quixote 73. New windmills to tilt at

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How many can we feed?

by Malcolm Slesser

Natural food production is a photosynthetic process in which the fraction of the incoming solar energy actually captured and converted to food is low (Zelitch 1973). Where man intervenes, he usually manages to improve on this situation, but does so by expending energy on the agricultural system. As technology has developed man has succeeded in developing more and more intensive forms of food production. This has now reached such a level that Oswald (1968) in California can claim that by a purely synthetic process all the USA protein needs could be created by a plant 25 square miles in area. Such a plant would, however, use more energy per pound of protein produced than is required by the less intensive methods practiced in the USA today, themselves extremely intensive by the standards of the under-developed countries.

While in today's developed countries the energy used for food production is small compared to that used for industrial production and transportation, it is tending to rise. Dubos (1972) has pointed out that "the present practices of scientific agriculture are possible only as long as cheap sources of energy are available." Moreover, many of the new unconventional and industrial protein sources are extremely energy intensive, yet many are being developed with the object of assisting the UDC's. In view of the fact that energy is the key global resource, and is certain to rise in price (Day 1972) an energy analysis of the food production process provides one with a way of assessing the long term implications of this or that method of producing protein. Berry (1972) has made the point that thermodynamic analysis is the way to assess the ultimate viability of an economic process. A primary step in such analysis is to determine the energy consumption per unit of production.

Such an analysis was done last year under the auspices of the Program on Policies for Science & Technology in Developing Countries at Cornell University in the USA. The analysis, which covered 131 protein producing systems, natural and industrial, not only showed the wide range of energy expenditure on food production, but revealed that this energy was very much a function of the intensity of production, in which intensity is expressed as the amount of protein produced per unit of land area. This aspect of the results makes the study particularly interesting from the point of view of food policy planning, and allows one to draw several important conclusions.

The food producing system

Fig. 1 depicts a food producing system. It is not necessary to know what goes on within the system, but merely the inputs and outputs over a given area. The output is the useful food produced, which in this study is expressed as weight of useful protein produced. Any by-product which has a useful energy content is credited to the system.

The inputs are more complex. They fall into three categories. First there are the free inputs of solar energy and rain. These are not counted, since the object of the study is to assess the energy subsidy applied by man to the food producing system. The second is the input of human energy and the energy for the life support of the human worker. This value depends greatly upon whether the system under study is highly intensive or not.

The third term compounds many direct inputs; mechanical inputs, transportation to and from place of production, nutrients, fertiliser, pesticides and herbicides, irrigation, seed, etc. Not all may be computed. In this work it was rarely possible to find data on irrigation costs, in terms of energy or money, alongside agronomic data, and this term has been omitted. In arid areas its value is not inconsiderable. An extreme case in Israel used an energy subsidy 50 x 10⁶k. cal/ha/yr





for irrigation alone. The absence of this term may account for the apparently high yields per unit energy subsidy obtained by rice crops. Nor was it possible to add in the energy content of capital goods used and depreciated in the course of production, because such data is not yet sufficiently widely available. This factor is also not inconsiderable. Makhijoni (1972) reports an energy content for agricultural machinery of 8,000 k.cal/lb. Thus a one ton tractor depreciated over five years has an annual energy content of 3.4 x 106k.cal. Hirst (1971) reports that the energy content of a US automobile is equal to 15,000 miles of petrol usage.

Transport energy was not included, simply because it is such a variable factor, and should be applied to each individual case. For the inputs to a system they are not great. A truck can move goods 500 miles for 131 k. cal/lb (ibid). This is a trivial fraction of the energy content of fertilisers and other inputs, but almost doubles the energy content of a product like wheat or rice.

The calculation of these direct inputs is a slow, but relatively simple procedure, and is reported in detail elsewhere (Slesser 1972,73).

Interpretation

Fig. 2 is a way of depicting data on the energy subsidy to food production. It contains few surprises, showing, for example, that rice production in Indonesia in 1964 (135 k.cal/lb of protein produced) is a great deal less energy subsidised than an Illinois wheatfield (1,300 k.cal/lb). This much has always been expected. Of course, the yields are vastly different. The Illinois wheatfield produced 260 lb/ acre of protein, whereas the Indonesian rice paddies yielded only 123 lb/acre protein. However, an examination of fig. 2 fails to reveal any underlying common denominator. A more conventional approach is to examine the data to see how the photo-synthesis, as reflected in metabolisable calories in the resulting food, compares with the energy subsidy to creating that food. Table 1 gives values for a number of systems studied. Again no clear pattern emerges, though there is confirmation that animal protein is a great deal more costly to produce than vegetable protein, a well-known fact. It is only when the data is expressed

in terms of intensity of production that a clear pattern emerges. In fig. 3 is a statement of what emerges when the log of the protein production per unit land area is plotted against the log of the energy subsidy per unit land area. Surprisingly, the data for vegetable and industrial proteins, whether from temporate or tropical lands, whether lavishly fertilised or marginally produced tend to fall on a single line. The area of least certainty lies in the range of marginal agriculture. An even more surprising feature is that, though as expected the plot for animal and fish protein shows a much greater dependance on energy, it merges with the vegetable protein plot at low intensities of energy subsidy. Finally grass fed

TABLE 1

Typical energy ratios for food

Metabolisable energy in food/ene	ergy subsidy
Sweet potato	18
Rice (UDC's)	10-36
Rice (intensive)	7.5
Potato	14
Potato (intensive)	2*-6.3
Oats	7
Peanuts	1.9*-8.7
Maize (corn)	2.9*-5.4
Soya beans	1.6*-3.0
Wheat	3.5*15.8
Algae	1.2
Sea-fish Peru	4.0
West of Scotland	1.1
Distant water trawling	0.08
Milk	about 1.0
Fish protein concentrate	0.1-0.45
Eggs (intensive)	0.4
Beef (low intensity)	0.35-5.4
Beef (grass-fed but intensive)	0.35
Beef (feed-lot intensive)	0.1
Petro-protein *	0.15





в . .







Fig. 4 Agricultural land per person (ha/capita) This figure is directly derived from Fig. 2. It shows the minimum energy required to furnish a diet as a function of population density, considering only agricultural land.

milk producers appear considerably more efficient, in energy intensity terms, than those fed on feedstuffs.

For those interested, Appendix 1 carries the equations of these plots, and their statistical significance.

What fig. 3 is stating is this: a given expenditure of energy on a food producing process achieves a better result if applied to a low intensity system than a high intensity one. Intuitively most people support such a result; a thermodynamicist would expect it.

Energy intensity as a policy tool

Fig. 3 provides an intriguing way of comparing dissimilar food producing methods. Let us suppose that a certain UDC, say India, has the ability to purchase the equivalent of 390 billion k.cal. If it used this to upgrade poor quality pastureland, such an input could yield 3.45 billion pounds a year of milk. Alternatively it could fortify with Lysine the wheat requirements of 120 million people, in order to improve the amino-acid balance of the wheat and thus its nutritional quality. The decision as to which is the best use of that energy lies partly with the nutritionists, but also with those concerned with economic and social welfare of the population. Upgrading pastureland would be expected to have a direct social and economic effect on the community. Importation of lysine manufactured under licence in some developed country, creates no direct social or economic benefits. The former constitutes a long term plan, the latter a temporary expedient.

The methodology can be applied even to developed countries. Pimental (1972) has estimated that the energy used in production of pesticide used in the USA is equivalent to 11,000 billion k.cal. At current levels of production intensity for foodstuffs in the USA, according to fig. 3, the same energy could produce 40 billion pounds of corn, or 150 billion pounds of potatoes or 70 million pounds of beef. A somewhat analogous conclusion was arrived at by Iowa State Agricultural College (Mayer and Hargrove 1972) which, using a linear programming model of US agriculture. deduced that though the abolition of fertilisers would require the use of more land it would raise food prices only 11 per cent.

Self sufficiency in food

Fig. 3 can be adapted to estimate the minimum energy requirements for food production so that a given territory may be self-sufficient (in broad terms, of course. There is no implication that Finland should grow oranges). In fig. 4 the line AC is based on a desirable protein consumption per head of 23.6 kg/yr (64 gm/day) (FAO 1957), allowing for 25 per cent losses, and assuming a purely vegetable or synthetic protein diet. It shows the minimum energy consumption per head in the food producing sector of the economy as a function of the agricultural land area available per head of the population. The line AB shows the minimum energy needs for a European standard of living, where two thirds of the intake is animal or fish protein. This line becomes asymptotic at around an agricultural land intensity of 0.05 ha/capita. Up to 0.4 ha/capita no difference is observed, and presumably all sections of the population can readily enjoy some animal protein. However, a surprising number of

Minimum energy for self-sufficiency in food

1970 population $\times 10^{6}$	Ha. Agric. land/Cap.	TCE/Cap. vegetable diet	vegetable diet TCE × 10 ⁶	1967 energy consump.	for high quality diet $TCE \times 10^6$
572	0.34	0.035	20.02	32	21.12
730	0.30	0.037	27.01	?	30.60
	-		30.0	?	-
202	2.24	0.02	2.04	0.07	2.04
	0.76			1.15	34.6
30	0.078	0.054	1.62	13.0	5.1
31	0.093	0.051	1.58	15.0	4.34
2.0	0.006	0.15	0.3	negligible	1.2
12.7	0.18	0.041	0.52	2.0	2.29
48	0.269	0.038	1.82	0.7	2.30
100	0.067	0.056	5.6	3.0	23.0
	1970 population × 10 ⁶ 572 730 202 30 31 2.0 12.7 48 100	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

countries exceed this intensity. They include most European countries, Japan, and such large Asian countries as India, China and Indonesia. Table 2 shows the estimated minimum energy needs for self-sufficiency for several countries based on fig. 3 and gives some idea of the immense burden food production is placing upon some economies.

For Japan, and the more densely populated countries of Europe, an adequate diet is synonymous with an adequate perpetual supply of energy. Already these countries depend for their high standard of living on imported meat and animal foodstuffs. In all these countries the actual energy expenditure on food production is much higher than the minimum indicated, which suggests that many socalled economic systems are basically wasteful.

The economist will argue that a calculation of this sort is absurd. That though it is true that the world as a whole must be self-sufficient in food, some countries will be exporters, others importers. England, for example has built up an entire industrial society upon this very concept, and today depends on imported food for about



40 per cent of its needs. It is worth looking at the significance of this. In essence, a country like England is using the land resources of other parts of the world. The physical area utilised in supporting 50 million people is not 57,000 square miles, but considerably more. The food produced in these lands is produced at a lower intensity of agriculture than in England, and hence is cheaper per unit of product. However, as the world fills up with people, these less intensive acres will have to be intensified, and inevitably the energy consumption per unit of food produced will rise. This must mean more expensive food imports. But England is now within the EEC, with a common agricultural policy. This in effect places limits on the degree of intensification open to English agriculture to the level elsewhere in the EEC. The National Farmers Union's dream of providing the basic English diet from home grown food, though once theoretically possible, is now foreclosed.

The cost of food

According to fig. 3 the energy cost of animal protein rises in proportion to about 4/3 power of the production intensity. Since intensity is always rising, it follows the energy use is rising even faster. Whatever the short term economics, it then follows that in the long term food prices must and will rise. However, housewives deal in pennies not kilo-calories. One way of demonstrating the inevitable is to use projections of population and available agricultural area to the end of the century, to arrive, with the aid of fig. 4, at the energy demand per capita simply for food growing purposes. This is done in fig. 5 for England. The energy cost curve is taken from Day (1972). From the product of the two, one obtains an index of relative food prices, which are seen to rise by a factor of six within 30 years.

How many can the world support ?

Fig. 4 is extremely explicit in answering the question "how many can the world feed?". In order for everyone to enjoy a diet of a European standard, the population density should not exceed 10 persons per hectare of agricultural land (0.1 ha/cap). Since there are some 1.37 billion hectares of

cultivable land (FAO 1967) it follows that the maximum sustainable population on a decent diet is around 13 billion persons, or not quite four times the present. If that seems optimistic, bear in mind that it has yet to be discovered whether land cultivated at this intensity can be maintained productive year after year. Many have grave doubts. Moreover, the energy needs for this degree of food production would be not less than 6.85 billion tons of coal equivalent for food production alone, not counting transport, and the energy for creation of the equipment associated with agriculture. This is just below the present rate of energy consumption in the world for all purposes.

Fig. 4 suggests that with non-animal or fish diet, much larger numbers can be accommodated at lower energy expenditure.

If good eating is something to do with the quality of life, there is a very good case for population control.

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Appendix 1.

1. Vegetable and industrially produced protein:

 \log_{10} (P)=0.82 \log_{10} (ES)-0.246 with a standard error of 0.085

2. Milk:

 \log_{10} (P)=1.3 \log_{10} (ES)-2.8 with a standard error of 0.104

3. Meat, fish, eggs: \log_{10} (P)=0.76 \log_{10} (ES)-0.46 with a standard error of 0.186

where P is the kg protein produced per hectare-year and ES is the energy subsidy, expressed as 10^3 k.cal/ha. year.



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21 June—Human adaptability in a tropical ecosystem (an IBP human biological investigation of two New Guinea communities). Meeting organised by G. A. Harrison and R. J. Walsh for the Royal Society and the Australian Academy of Science. At 10 a.m. Details as above.

9-13 July—A Biological Approach to Soil Husbandry. A one week course arranged by the Soil Association on the principles and practices of organic husbandry will be held at Ewell Technical College. Fee for the course

around £13—which includes meals—and landlady accommodation can be arranged locally. Write to Dr. A. Deavin, Research Director, Ewell Technical College, Ewell, Surrey, or the Soil Association, Walnut Tree Manor, Haughley, Stowmarket, Suffolk IP14 3RS for further details.

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Some of my best friends are motor cars

by Peter Bunyard

Much has been said about the motor car; its defenders singing its praises for the speed and comfort with which it can transport its occupants wheresoever they want, and its detractors damning it for having inflicted such fearful damage on the environment and on the increasing multitudes of human beings who happen to have got in its way. It therefore makes a change to come across a document which gives its readers some plain facts and figures as to where the motor car is likely to take them and the rest of the world should its numbers continue to grow as the would-be possessors of that infernal machine would like.

The Motor Car and Natural Resources* which Gerald Leach, erstwhile science correspondent of The Observer, has compiled for OECDthe Organisation for Economic Cooperation and Development-is now available, and there are some interesting surprises in it for those who believe, or would like to believe, that the motor car and the concept of personalised transport is nearing its end because of an impending shortage of resources. Not that the motor car as we know it will have it all its own way, for, says Gerald Leach; "Unless the higher estimates of ultimate world reserves of oil prove to be correct, the fuel demands of road transport are likely to provoke a severe oil shortage by the end of the century".

As for metals, in particular steel, it seems most unlikely that the car will be the cause of their running out in

* The Motor Car and Natural Resources by Gerald Leach OECD, 1972. the foreseeable future. "The major reason," Leach points out, "is that vehicle populations are expected to grow at a slowing pace: consequently the number of vehicles retired each year will become an ever-higher proportion of the number of new cars that must be made to maintain the desired population".

An estimate of the number of cars, past and present in the world, can apparently be made with a fair degree of accuracy because of licensing requirements. At present there are some 200 million cars in the world and they consume close to 6 per cent of world energy production, twice that percentage of world oil production and 5 per cent of the production of iron and steel and of the four non-ferrous metals, aluminium, copper, zinc and lead. Road vehicles as a whole take about 10.5 per cent of the gross energy produced in the world and therefore about 21 per cent of the oil.

Inevitably there are gross disparities between the rich and the have-nots, and the Western industrial nations comprising OECD owned 91 per cent of the world's cars in 1970. The lion's share naturally went to the United States which consumed two-thirds of the oil burnt in cars and used twothirds of the metal resources. The average car in the United States, Gerald Leach points out, is twice as heavy and consumes twice as much fuel each year as its counterpart in Europe.

How many more?

Just how much the world's fleet of cars is likely to grow over the next 30 years could be anyone's guess. There appears to be a saturation level of around 500 cars per 1,000 population, and in the United States which already has a car population of 430 cars per 1,000 people, the growth in the car population is not likely to amount to more than a 70 per cent increase between 1970 and 2000. The other OECD countries—Western Europe and Japan—have a long way to go before they catch up with the United-States; their car populations stand at half or less the numbers per 1,000 population; and a number of wellbased "official" projections imply that the West European car fleet which nearly trebled during the 1960s, is expected to double by 1985 and to grow by 2.6 times by the end of the century.

The staggering increase has been in Japan. It was 18-fold during the sixties and is expected to show a further 7.5-fold rise by 2000. Then its car fleet, like that of West Europe's, will stand at around 500 cars per 1,000 people, similar to the car population of the US.

But is that going to happen? Are Europe and Japan, both of which are so much more congested and highly populated than the United States, going to allow themselves to become inundated with cars for the sake of two-car ownership? Gerald Leach refers to a recent OECD report which claims that because of major changes in patterns of city transport, car ownership is bound to fall during the next 20 to 30 years.

Nevertheless there are strong, irresistible factors promoting the continuing and even expanding manufacture of the motor car. The car, unlike any other technological gadget yet devised by man, has become a symbol of personal power and freedom, and in our technologically-oriented urbanised age the desire for such a symbol is apparently necessary to compensate for some inner frustration that man feels but is unable to cope with. By cashing in on this motivation the motor industry has achieved a position of prime importance in the economy of highly industrialised nations like the United States and Britain.

The figures tell their own story: "In Europe an estimated 15 to 20 per cent and in the USA 20 to 30 per cent of the entire labour force is employed directly or indirectly in connection with the motor car", says Gerald Leach, and he points out that by such simple expedients as reducing or increasing taxation or hire purchase requirements, the entire nation's economy can be made to pulse more or less rapidly.

The temptation to own a car is no less in the rest of the world where car ownership is still very low. Yet taken as a whole car ownership is expected to attain a level no higher than 20 cars per 1,000 population by the end of the century, despite a six times increase in car numbers. Thus by 2000 the OECD countries will still finish up with a vast majority share in the world's car population—some 78 per cent.

How efficient is the car?

Without questioning the necessity of everyone charging about their business and pleasure in their own personalised transport, how efficient is the motor car compared with other means of transport? Estimating the car's efficiency depends how far one goes back and how much one includes in the energy costs. Does one include, for example, the energy for extracting and processing the materials used in vehicles, vehicle construction, the building and maintenance of roads as well as the energy used in sales promotion and in selling fuel? If one does then the energy used by society just in transportation of people and goods whether by car, lorry, rail or even canal, comes to something like 40 per cent of the total energy input. Just taking the car on its own, the average USA car needs some three tons of oil equivalent in its manufacture-"as much as it takes to run the average car for 18 months, or about 15 per cent of all direct fuel costs over an average car lifetime of 10 years", says Gerald Leach.

The American car is a more profligate consumer than the average European car. Whereas the former requires some two tons of fuel every year to take its passengers an average 15,700 kilometres, the European compact car gets by on about one ton of fuel.

Not that the car is necessarily the least efficient means of motorised transport, and if run with a full passenger load it comes out nearly as efficient as a diesel-electric train or a city bus. Yet, as one knows full well, most cars driven during the day in town contain no more than one passenger. The average efficiency of the car in the United States therefore comes out little better than a jumbo jet at just over 30 passenger miles per US gallon, which is equivalent to 130,000 BTU. The cyclist by comparison can transport himself more than 1,000 miles on an equivalent amount of energy.

Some 350 passenger miles per gallon of fuel seems about the highest limit to date for motorised transport of any kind, and, however much of a carhater one might be, one cannot overlook the fact that a 1.5 litre Volkswagen Microbus, loaded with seven people, just about scores that figure. "On these measures", says Leach, "one can argue that the much more efficient use of private cars-through car-sharing schemes on a rota system or perhaps through 'mini-cab' and systems-would other taxi/rental compete admirably with many present public transport systems-provided the cars were small".

World oil reserves

One then comes to the all-important question of the limits imposed on a world car population by a shortage of its fuel—petroleum oil. Here again the issue is fogged with uncertainties and possibilities. The estimates for ultimate recoverable reserves of oil throughout the world vary from a low of around 1,350 billions of barrels (10⁹) to 2,500 with most estimates falling in the 2,000 billion barrel range. The car, consuming more than 10 per cent of the world's oil production each year, and growing in numbers and popularity as it is, is obviously an important consumer. How much crude oil is required for the manufacture of petroleum can vary by a large margin. In the United States for example one ton of fuel is extracted from every two tons of crude oil, whereas the equivalent amount of fuel is extracted from five tons of crude oil in Europe. Thus, if the European countries decided that fuel must be made available for road transport, whatever the cost, they could follow the American pattern of crude oil refining.

Then too, all cars could become considerably smaller both in size and fuel consumption. General Motors have thought up a car with a reasonable performance which weighs around one ton and yet only consumes around 1.3 litres per 100 km-about one-eighth of the present European average. Both factors-size of car and oil-refining-could thus have an immense effect on the total global oil consumption. Indeed the world car population could increase some 17fold if both factors were introduced simultaneously now, without leading to any increase in the fuel consumed.

That major changes will come is inevitable, especially if the ultimate oil reserves are anywhere near the lowest estimates, for assuming that the present trends continue both in size of car, its fuel consumption and refinery practice, Leach has shown that within the decade the requirements for car fuel will exceed production by



a considerable margin. And even if the highest estimates are taken the margin "of safety" is not all that great and will be overrun early on in the next century.

There are alternative fuels, including liquefied natural gas, methane derived from organic wastes, liquid hydrogen derived from the electrolysis of water, perhaps using nuclear power as a primary energy source, and battery-run cars, the primary energy source again being nuclear.

If we want cars we can have them

One cannot help but come to the conclusion that if the world wants to have cars there are few ultimate physical limits, if any, to stop it, except the grinding seize-up caused by congestion. Even non-fuel resources present few ultimate problems so long as the differential between the rich and poor throughout the world is retained and the entire future population of the world—which could reach more than 10,000 million sometime in the next century—does not strive to attain the 500 cars per 1,000 population target of the OECD countries.

Indeed, once saturation is achieved in any nation the recycling of the metals in a car can go a long way to fulfilling the requirements of the motor industry. Even now more than 85 per cent of the metals in American vehicles is recycled and the percentage is going up due to environmental concern over automobile graveyards.

To elaborate this point Leach shows that with 100 per cent recycling admittedly improbable—new metal will have to be mined for only two million cars each year in the United States, although some 247.8 million cars will be either produced or imported during the 1970 to 1990 period. By the same argument yet this time applied to the entire world new metal will have to be found for some 12 million cars a year although total production over the 30 year period, again assuming present trends, will amount to some 1200 million cars.

Some of the metals used in car production, notably lead, zinc and copper, will undoubtedly become scarce, probably by the end of the century, but again there is no threat to car production insofar as other materials, including plastics, can be used as replacements.

In his most readable report Gerald Leach has neither condemned nor condoned the motor car; just presented a few fascinating and extremely well documented facts. But, although Leach only refers to them obliquely the costs are there and not so hidden either. The majority may indeed have no doubts at all about the usefulness of the car and the benefits it is supposed to bring the human race through mobility, but it is all too ready to forget the costs. Its reckoning is based on false premises. In The Restless (Davis-Povnter Generation 1972). Patrick Rivers has given us an inkling of the real damage done by the motor car-the fact that each year in Britain alone motoring offences cost some £95 million in police costs; road accidents cost at least £320 million in National Health costs: road construction and maintenance come to £800 million; in addition there are the unaccountable costs to society of noise, dirt and, at the present time, of a continual fall-out of poisonous substances including lead.

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Development and human ecology

by Robert Waller

The principles of human ecology and its problems have been defined and redefined of recent years: what we need now is an organisation to formulate plans for action. Such plans must be guided by people who unite practical experience with ecological knowledge, people from many occupations and disciplines joined together by a common philosophy. The aim of such action planning must be to give development a new direction that turns it into a radically new sort of progressdevelopment with human ecology.

Such a pioneering organisation exists and has been surprisingly successful in a short time: the Commonwealth Human Ecology Council (CHEC). It owes its existence to a New Zealand physiotherapist, Mrs Zena Daysh. Since the beginning of World War II, she has always urged human ecology as the essential framework of planning. By her persuasive arguments she instigated and played an active part in an inquiry into production and health when she was consulted by the Ministry of Supply during the war. The inquiry proved its practical value with improvements in production that could be traced to its recommendations. Later Mrs Daysh persuaded the Commonwealth Committee on Preventive Medicine, of which she was the convener, to transform itself into a committee on nutrition in the Commonwealth. This committee was to become the nucleus of CHEC.

For Mrs Daysh there could be no failure, for the aim was the survival of civilisation. She saw that all paths nowadays lead to human ecology, whether it is productivity in industry, or nutrition, or roads or population or housing or agriculture. Human ecology must provide the framework of civilisation now that development moves at such a pace.

When Zena Daysh was investigating nutrition as a part of human ecology she visited Malta (1964) and suggested to the government and the university that they should set up a Malta Case Study. As Malta is an island it offered special advantages for such a study of the relation of nutrition to health. In due course this case study expanded into a human ecological survey of the island. The Malta Case Study will, I believe, become an historical landmark in a radically new way of planning that considers the environment as essentially a human habitat. To do this the governing must know a lot more about the governed and must set up far more feedback agencies-to use the current jargon. The Case Study provided the groundwork for the First Commonwealth Conference on Development and Human Ecology: this conference was held in Malta in 1970 and the proceedings have been published. Ecology in the Human Commonwealth (Charles Knight 1972), edited by Professor H. Bowen-Jones, who has long been associated with Malta, besides speaking and writing on the need for a philosophy of human ecology.

The importance of this book has not yet been grasped by many people in this country. It does not simply concern those whose special work is Commonwealth relations. It is a guide book for all concerned with human ecology and development of whatever level. The Malta Case Study, for example, which is described in detail, could serve as a model for similar case studies based on human ecology whether they are conducted by national governments or local governments.

The Malta Case Study team has developed into the Malta Human Environment Council, now a consultative body to the Ministry of Development. What political body, from a District Council to the Cabinet, could not benefit from a Human Environment Council? Any problem that the Malta government feels is relevant is brought to the Council's attention for discussion. The Malta Case Study and other case studies are fed into CHEC HQ where they pass out for the benefit of others.

The successful conference at Malta. attended by delegates from 15 Commonwealth countries, was followed by another in London to discuss with Commonwealth delegates the future role of CHEC and its organisation. CHEC clearly emerged from these discussions as a consultative body able to advise any government, national or local or regional, or any international agency on problems of development and human ecology. It was decided to set up affiliated groups throughout the Commonwealth. These do not have to take a standard form: they may be voluntary bodies, or government departments, or a university group, or a professional body. Examples of all these can be found in different countries. Inside politics vital issues tend to be handled with reservations and compromise: an outside consultative body need pull no punches.

Ecopolitics

From the outset CHEC did not shirk the fact that it was dealing with political issues. Without politics little of scale can be done. The Council also knew that human ecology was "of" politics but not "in" politics. (Whether a new party with human ecology as its platform may become necessary in the UK is another matter. If so, half its work will have been done for it by CHEC).

The London conference also prepared the way for the Stockholm conference, where Maurice Strong gave CHEC every encouragement. The Council meeting of CHEC held in Stockholm was attended by many Commonwealth delegates who found the time to break away from their official duties to take part. H.E. Mr Keith Johnson—Jamaica's permanent representative at the UN and Rapporteur-General of Stockholm—took the chair.

At all the CHEC's international gatherings the delegates have revealed how eager they and their governments are to find practical means of integrating the human ecological approach with development and planning. They welcome the initiative taken by CHEC in this difficult field. They recognise that advice must be garnered from all the Commonwealth. The advantages of the common language and shared experience of the Commonwealth countries, covering a quarter of the world's land area and population, is evident in the way proceedings can move on. The Commonwealth ranges over the least and the most developed areas of the world. This diversity compels those who take part in CHEC's discussions to consider the vast range of circumstances and points of view and cultural backgrounds that make up human society. This experience is an essential condition of the total approach that human ecology demands. The Commonwealth also has the advantages of not being a power bloc, so that CHEC's meetings are not perverted by the strategies of

The year 2000

It will be great, I said to my mate. We'll be able to drive cars, To mars. To go to Jupiter, By computer. But I like the trees, And the bees. I don't want to pass a star, While driving a car. We will be able to think, Like Colonel Blink. But I like the sea, And I want to be me.

Russell Triggs (age 10) power as they might in other international groupings.

The motives of CHEC are seldom questioned and will be increasingly less so as representatives from all the countries of the Commonwealth join its Council. For example, the Council is well aware that pollution control may seriously handicap development in a backward country unless the means of control are subsidised by the developed nations. We cannot ban the products of developing nations on ecological grounds unless we assist them to develop ecologically. This would be imposing a handicap that the developed countries never faced. The point of view of the developing countries, so different to those of the developed countries, is well understood in CHEC, as many of its Council and its members have worked both in developed and underdeveloped nations. In this respect it has advantages over government departments and agencies which are tied to the prevailing political policies of their own governments.

Gaps in the wall that separates the nations might have a large sign sited near them: CHEC point ecology. For human ecology is becoming the password used by those seeking to create unity in diversity.

Hong Kong Conference

The Second Commonwealth Conference on Development and Human Ecology was held in Hong Kong in 1972. Here the ecology of densely populated areas was the focus of attention. A case study of Hong Kong is being planned and a general study of the ecology of cities is a long term CHEC project for one of its working parties.

There is no need to spell out in detail the high personal level of CHEC's Council and supporters under the presidency of Sir Hugh Springer of the Association of Commonwealth Universities. If it were not so, the Commonwealth governments and the United Nations would not have been so ready to co-operate.

CHEC believes that the Commonwealth should now marshall its overall services and mount a comprehensive conference within the next three years. In preparation for that, all Commonwealth interests, governmental, scientific, professional and the public sector, should join forces and devise a Commonwealth ecological working party action plan. This will be CHEC's chief aim.

CHEC is adding to the operations it has already undertaken. For example, following a conference held at Huddersfield-jointly organised by CHEC and the polytechnic-on education and human ecology, the Commonwealth Foundation has given another of several grants of CHEC to finance a survey of human ecological courses throughout the Commonwealth. Training and research, as well as straight teaching, should, CHEC thinks, run together within an interdisciplinary harness.

The complexity of environmental problems are drawing together government, people and professional and voluntary bodies and agencies in a common task-humanising development. This is increasing the democratic processes and perhaps even changing the shape and organisation of the community. Education must play a vital part in this, hardly as yet observed. historical and political phenomenon. But if education does not work quickly and extensively to provide knowledge of human ecology, a small educated elite, especially in the underdeveloped countries, is likely to dominate. CHEC wishes to do all it can to develop networks of knowledge and information in every direction.

An information service under the direction of J. Bowen Jones, Director of the Commonwealth Bureau of Agricultural Economics at Oxford, is now functioning.

Development with human ecology is the inspiration of all these CHEC activities. All those, as individuals or groups, who would like to join—or to know more about it—should write to the General-Secretary, Mrs Zena Daysh, 63, Cromwell Road, London SW7.



The flowers are not for us to pick

Much of England's green is now cool, temperate region, exotic grasses like barley, overtopped here and there by the native couch or wild oats which still defy the selective weedkillers, or chequered by equally featureless squares of crop grasses. The unnatural monochrome of the hedgeless acres of Salisbury Plain and the Hampshire and Berkshire Downs may be good-possiblyfor the balance of payments but they are as unsatisfying to view as much as the deserts of peat or nardus in Yorkshire or Scotland. The native flora has shrunk to such a little measure that from 1971 this must be the rule for motorists, parents, children, teachers, botanists amateur and professional: To take only what we have put there.

Six years ago I began a quest for specimens of all the British saxifrages. John Raven and Max Walters in *Mountain Flowers* say that this genus "is perhaps the outstanding example of a group whose British representatives are predominantly mountain plants"; so the quest fitted both my pleasure in walking the hills of Scotland and enjoying plants, I had four species to go when it came upon me that this was a barren enterprise: I saw that now no one should take a plant from the surface of these islands—unless they have put it there.

One does not need to be a conservationist to see that this rule must apply to "very rare and local" things like brook, drooping and tufted saxifrages. I am glad to say that I applied it to meadow saxifrage, which has still a fair number of squares in the Atlas of the British Flora. A friend told me of a stand in Wiltshire and when I found the plant with its rosette of basal leaves, loose cyme of marble white, old fashioned wine cup flowers, carried on a stem with few leaves, a princess among the white clouds of common stitchwort, the temptation to pick was strong. It was even stronger when I found another, more plentiful stand, but as far as I am responsible the number of plants is the same.

Since my son once won a prize for a collection of pressed flowers, I suppose I should plead hypocrite. The collection contained ploughman's spikenard, corn gromwell, bee orchis, pyramidal orchis, even violet helleborine-though from this we took only a leaf and two or three flowers. But was 20 vears ago. Then that motorists, whose children, if not disciplined by their parents, are the most ravenous pickers, seem to pick most widely, were less than half the number they are today. Motorists' children, innocently and unwittingly of course, cause fear for plants and tree fruits because they seem to get into every gate, stile, footway, copse, wood-and not only take plants but crush and break them underfoot. The most fearful, the most ravenous children are those who want to please Mummy or teacher. In Wiltshire last summer I saw mites hugging forearm loads of cowslips and bluebells. (These plants were from War Department land where there are tanks and shells which do not destroy like weed-killers and hedgegrubbers.)

Motorists, Mums and teacher must become unprogressive and raise "Don't!" forbidding hands. An apple for the teacher may be all right but a bunch of flowers, even a single bloom, is not—unless it comes from Mum's garden.

Teacher's predicament

The teacher in school, college or university whose subject is nature study, rural science, biology, botany or environmental studies (to give it its latest name) is in the worst predicament. Plants are the very material of his subject. The practice of the good teacher is always to try to have a real object in front of his students; his professional conscience prevents him making the subject only chalk, talk or television, so he will not work without an object.

How can he avoid picking the flowers?

If he wants to teach anatomy, morphology or physiology, he must grow the plants in the garden or greenhouse before he uses them. The so-called weeds of cultivated land we have at one remove put there: and they also can give plenty of material. It might appear that wild trees and shrubs may also be an exception to the rule. We cannot grow quickly and just like that things like common beech and common ash. In these cases the taking of a few leaves, flowers or fruits from the wealth of each canopy would seem harmless. The cutting of twigs, which with their buds, scars and other features are an instructive and interesting winter study in schools, can be a kind of pruning if it is done carefully. The ornamental and utilitarian conifers, a beautiful medium for teaching exactness and discrimination for all kinds of learners, are a perpetual source in these days of economic forestry and sophisticated landscaping; and someone has certainly put them there before we take parts of them for teaching.

The great difficulty comes when classification of plants and their recognition are the need. (In modern "progressive" schools teachers may not get pupils to learn facts; but no one loves a plant any the less—and therefore wants to conserve it any the less for knowing it and its name, scientific or English.) With students and for the larger groups of plants such as the familities, one or two flowers or flowerheads can be sufficient for teaching. With younger pupils leaves carefully removed from plants are a good and lasting means of knowing the individual species. Even Secondary Modern pupils can construct their own keys based on leaves.

There is also a personal problem for the teacher himself. For a teacher who is an amateur botanist-and many teachers of these subjects are thatthere are few things pleasanter than collecting familiar and unfamiliar species, bringing them to the study or laboratory and identifying them with lens, lamp and flora. It is most satisfactory if one can do this without illustrations but with the rigour of careful recording of dimension and morphological detail. To apply the method satisfactorily at least one specimen has been necessary: to use it in future we shall have to make do with a leaf or single flower-or even forego these and content ourselves with a sketch or photograph.

The practice of ecology needs that the teacher at least "knows his plants", for ignorance can lead actually to harm by treading by large numbers. I saw a patch of *Ornithogalum* looking pretty sick last May after some 18 pupils had passed nearby, though I am glad to say that the same 18 pupils carried out their ecological study without taking one plant. Such abstinence is not always the rule: I have heard a Rural Science teacher remark that Swanage has hardly any plants or grasses left.

Fieldwork is the thing

It has long been de rigueur for ornithologists to practice their science without taking the skins or eggs of birds: only fieldwork is the thing. Plants must go into a like conserving category. Botanists, amateur and professional, must come to regard a plant in the same way as birdmen regard skins or eggs: they must forego sets of specimens, perhaps even herbaria. It seems a natural occasion for pride and demonstration of knowledge, effort and endeavour, the herbarium type specimen mounted meticulously and endorsed with scientific name, time and place of collection.

What can motorists, teachers, botanists do to compensate for the proposed sacrifice of picked, collected or pressed specimens? For motorists and children (and pupils) there is not only the discipline of foregoing: there is the garden, the greenhouse, the window box and the laboratory. For

amateur and professional botanists there is photography. Colour photographs are more expensive than pressings but they can give pleasure and they can be instructive in a way in which a pressing cannot. It is possible to show the plant itself close up, its habitat and the effect it has had upon the landscape and other plants in the habitat. These can be points for discussion as well as occasion for reminiscence long after the botanising is finished.

If the teacher or botanist doesn't always want to lug about a camera there are still plenty of means of identification. Many botanists say that the best way to know a plant is to draw it. Now we must go one better: we must sketch the plant beforehand with measurements and morphological detail so that we can recognise it-and leave it. If we wish to draw it from the specimen we must do this in situ-without picking it. We cannot plant Saxifraga cernua (drooping saxifrage) at 2,700 feet on a towering northfacing buttress in Glencoe, one of its sites according to Mountain Flowers, so we have to leave it there. The same rule should apply to meadow saxifrage and "the meanest flower that blows."

OASIS IN SPACE

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Angus & Robertson

Towards a unified science

The directivity of cultural behaviour

Cultures do not develop at random but in an orderly manner like all other behavioural processes (see "Towards a Unified Science". *Ecologist*, Vol 3, No. 1).

As Murdock writes:

"Culture is adaptive or functional, sub-serving the basic needs of its carrier and altering through time by a sort of mass trial and error in a process which is truly evolutionary, i.e. characterised by orderly adaptive change".¹

The function of culture at the social level of complexity is precisely the same as that of the personality at that of the individual. A culture develops as a response to a specific, in this case, long-term, environmental situation. We know that a sub-system cannot be examined in vacuo, but as part of a system. Remove the particuenvironment to which the lar sub-system or its behaviour pattern is an adaptation, and the latter loses its raison d'etre and will simply atrophy. Modify the environment, and clearly the behaviour pattern must be correspondingly modified.

This is illustrated by Kardiner in his discussion of Comanche culture. The Comanches had a cultural behavioural pattern that was optimum for a hunting and food-gathering people living in a relatively arid environment After the arrival of the white man, this environment was modified in many In particular, there were ways. migrations of other Indian tribes, and the horse made its appearance. To these new conditions, the Comanches slowly developing reacted by a "bandit" culture, living by preying on their more civilised neighbours. This was reflected in a corresponding change in their culture. Thus the most prestigious figure was no longer the medicine-man but the war-chief. The

attitude to the aged changed. Previously, infanticide had been practised, as among most food-gathering peoples. Children now became more valuable, and the adoption of children from neighbouring tribes to be brought up as warriors increased. The ghosts were far less feared, since they now had real enemies to fulfil the same function. The sun-dance, originally connected with masochistic and self-destructive rituals, played a less important role as much better outlets for these psychological requirements were now available. The notion of "mana", or power, which was fundamental to the Comanche model of the world, began to be attached less to property and became transmissible from man to man and pooled by the group. There was a decline in the fear of the dead. The old rituals involving the burning of a dead man's property slowly fell into disuse. In general, a new culture developed which was highly adaptive to the new circumstances in which they lived. However, when the environmental conditions were once more radically transformed, this time as the result of the confinement of this warlike tribe to the shelter of a reservation, cultural pattern totally disits integrated. As Kardiner writes:

"The society could exist only as long as there were slaves to steal, cattle to rustle; in other words, the fine ego-structure of the Comanches bought at the expense of was criminality perpetuated on others at the cost of the complete collapse of the society once this criminality was incapable of being exercised. No internal growth or expansion of the society was possible. The results of acculturation of the Comanches bears this out. When they were returned under Government protection, the culture continued to exist largely in the memories of the old men. The children became less important, no feasts were given in their honour. The sexual development was given free range. The aged again became important, because the young could perform no exploits to compare with them. The status of the old was further advanced by the creation of vested interests".²

The same thing happened to the pastoral Navahos once they were deprived of their cattle. At first sight, the symptoms of cultural breakdown could be attributed to a fall in their standard of living. That this was not primarily so is shown by Simpson :

"With the decline in livestock holdings came a necessary decline in certain types of behaviour viewed as desirable by the Navahos. Kin did not fulfil their obligation to kin, neighbours to neighbours, rich to poor, because the wherewithal for reciprocity and generosity was no longer there. There was a pervasive feeling that people did not behave as they should, or as they once did, and this I would call a deprivation in the area of behaviour."³

Aberle considers that the loss of livestock holdings among the Navaho was one of the principal causes of that revolutionary messianic cult known as Peyotism, which developed shortly afterwards:

"The Peyote cult, with its protesting ideology and adjusting ethic, 'made sense' to people whose traditional culture could no longer operate effectively, and who were forced to accommodate to the new situation".⁴

It is the realisation that cultural traits are directive and adaptive that leads to the notion of a culture as a control mechanism and of the society that it controls as a natural system whose behaviour is subjected to the same laws as that of all other natural systems (see "Cultural Convergence", *Ecologist*, Vol. 1, No. 6). This sort of thinking is also giving rise to a vital new discipline: Cultural Ecology. *Edward Goldsmith*

Notes:

- 1. Murdock, G. P., 1965, Anthropology as a Comparative Science in Culture and Society, Pittsburgh University Press, pp. 160-1.
- Kardiner, Abram, et alia, 1945, The Psychological Frontiers of Society, Columbia University Press, N.Y., p. 95.
- Simpson, George E., and Aberle, David F., 1964, "Cultural Deprivation and Millenial Movements: A Discussion", *Cultural and* Social Anthropology, in Hammond, Peter B.,
- editor, Macmillan & Co., N.Y., p. 540.
 Aberle, D. F., 1966, *The Peyote Religion* Among the Navaho, Aldine, Chicago, p. 353.

Demo-technology

Heat pump heating

Nearly everyone thinks of refrigerators as "one-way" machines for extracting heat from a cold space. The heat has to go somewhere, explaining the warm or hot coils at the back of fridges. Older fridges often have a small grille above these coils, a pleasing design feature for cats who enjoy a warm secure place from which to view the kitchen.

The normal domestic refrigerator can also be called a heat pump, since this is exactly its function: to pump heat out of its interior. The power consumption of fridges is, as most people know, very low, the compressor motor that forms the base of nearly all refrigerators requiring only a few hundred watts of power.

If the interior of a fridge is at freezing point (273° Kelvin) and the temperature of the kitchen is 20°C (293°K) then the very minimum of work that would be required to maintain this temperature difference would be measured by the 20 degree temperature difference. Maximum possible performance ratio of a fridge in this situation is therefore:

$$\frac{273}{293-273} = 13.1$$

This means that in theory the fridge could extract 13.1 units of heat energy for each one of work energy applied. Needless to say this is impossible, and normal performance ratios are in the region 2.5–4.

Any large low-grade energy source can be tapped with a heat pump: heat in the air, the small amounts of heat in the ground, solar energy, and water heat all fit the bill. Air coils outside a house can extract heat from the air, but when the coils freeze, as they easily can in winter, the performance ratio goes down. Ground-source heat for a heat pump runs the risk of corrosion problems, and access is of course difficult. Water bodies, which in the UK rarely freeze, are probably the most reliable sources for heat pumps, but of course require houses using this system to be near water.

Solar energy presents an attractive alternative to ground or water heat as a heat source. First, the use of solar energy for summer water heating in the UK will probably grow rapidly since it is effective, cheap, and causes no pollution whatsoever, and of course. puts the user one up on his neighbours. Secondly, a solar flat plate collector's performance goes up as the heat of the water (or whatever heat transfer agent is used) extracted from the collector goes down. In winter in the UK it would therefore be possible to extract, with a heat pump, as much as 100 Watts per square metre of plate, even in mid-winter. A 30 square metre collector array could therefore provide as much as 3kW of heat. In conjunction with the use of a large tank to store heated water, and good insulation levels, this amount of power could satisfy a large proportion of heating requirements.

The compressor of a heat pump does not have to be driven by electricity, especially mains electricity which is more than 70 per cent inefficient by the time it gets to the home. An attractive alternative is to use water or wind power to run the compressor, making possible a complete noncombustion heating system. Another interesting drive is a light steam engine, running on alcohol produced by fermentation of organic wastes. The steam engine's combustion products should only be water, and because of this the engine can be kept within the house, and excess heat from the engine taken directly to the "thermal flywheel" or large tank.

There are at present no manufacturers of domestic heap pumps in the UK, but Low Impact Technology Ltd. can import units from manufacturers in the USA, Sweden and elsewhere. Our company is also looking into home assembly of heat pumps since imported they are usually more than £600 each. A final point when considering costs is that heat pumps can work in reverse, to give summer air conditioning.

Andrew MacKillop



Down to earth

High-speed protein builder

On the Equator, where days and nights stay the same length all the year round, Comfrey has grown 124 tons an acre in 12 monthly cuts. This record yield in 1955 came from Nakuru in Kenya on five acres producing a kind of "grow-it-yourself" cattle cake fed with Napier Fodder (fodder sugarcane) that "kept three cows in milk where one starved before" in the words of James McInnes, then Secretary of the Kenya Milk Recording Scheme, whose herd it saved the year the long rains failed.

Unfortunately this perennial fodder crop, a member of the Boraginacea, and a hybrid between *Symphytum* officinale and S. asperum, is attacked by Pyrethrum eelworm, and so much of this insecticide producing crop is grown in Kenya that it prevented the spread of Comfrey as an answer to their protein problem.

The largest Comfrey field in the world today is 25 acres at Mteroshanga in Rhodesia where Mr J. Phillips has mown a steady 75–85 tons an acre and fed it to bullocks for nearly 20 years. In Zambia the same kind of yields were secured by Mr L. Fairchild of Chingola when he was feeding it to poultry in the 1960s, on his modification of the deeplitter system for tropical countries.

The world has an increasing protein shortage and the factory farms of Britain will have to pay more and more for fishmeal to compete with the undernourished children of South America to whom a fishmeal enriched bread would be a valuable diet supplement. A hundred tons of cut comfrey holds $3\frac{1}{2}$ tons of pure protein, which is over three times as much as from sovabeans on the same area.

In 1966, the Cruzada Nacional Por Enriquemiento de los Alimentos, appealed to the Henry Doubleday Research Association to find out if Comfrey could supply any of the missing amino-acids from the protein in the bean and maize diet on which two-thirds of the Mexican people live. The most important of the three is Triptophane, for unless we have more

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than enough for our daily needs, we develop cataract in middle age.

Dried Comfrey leaf has 0.64 per cent Tryptophane, better than any other vegetable source, and about twice as rich as cheese, 0.58 per cent Methionine, beaten by Cheddar cheese at 0.66 per cent and Mexican at 0.65 per cent, and the third one Isoleucine at 1.15 per cent beaten by butter beans with 1.28 and both cheeses. Though British vegetarians can balance their diets with cheese and eggs, and vegans (who eat nothing of animal origin) can choose among the nuts of the world and the packets in the Health Food shops, the vast majority of vegetarians are meatless from poverty, not choice, and eat only what they can afford.

Comfrey is the only land plant so far known to take up Vitamin B₁₂ from the soil, for the only other vegetable source is the seaweed Porphyra vulgaris, which makes laver bread in Wales and "dulse" on the West Coast of Scotland. This was discovered in the summer of 1959 by the late F. Newman Turner, first President of the HDRA, in the course of his work with dried Comfrey tablets as a possible asthma cure. He found they were curing the symptoms of B_{12} shortage in patients who were vegans and cut off from the supply in eggs, milk and milk products, to which meat eaters add liver, fish and meat, especially sweetbreads. Analysis showed that dried Comfrey held 0.58 micrograms per 100 grams, which was confirmed with samples from Association members in several countries and by the work of Dr Frank Wokes of the Vegetarian Nutritional Research Centre.

The recent work of Dr Wokes has solved the mystery of how the B_{12} got into Comfrey manured only with poultry manure, when it was formerly believed that the vitamin was made only by bacteria in the stomachs of grazing animals. Dr Wokes has now established that B_{12} is also made by the digestive bacteria of earthworms, which accounts for its presence in both Comfrey and free range eggs.

In northern latitudes, Comfrey goes dormant as the days shorten and give

the signal, and in Britain it gives only four to six cuts between April and October and a yield of 50–69 tons an acre, on good land, kept clean and well manured. Today it pays to feed to racehorses, with wheat cavings or chaff to supply starch equivalent, and a very great saving in costs compared with the protein and mineral rich matured hay fed by studs and racing stables. It also pays for pigs up to pork weight where leaner pork brings a better price, and for poultry in many countries.

Comfrey has more protein in relation to fibre than any other fodder crop, 3.4 per cent against 1.5 per cent compared with 1.5 per cent to 2 per cent for cabbage, 1.7 per cent to 5.6 per cent for green maize, 2.2 per cent to 2.5 per cent for kale and 4.1 per cent to 7.2 per cent for lucerne. This is why it is essentially a pig and poultry food, and in Japan where there are now 28,000 Comfrey growers, it is used to cut the meal ration by half, for both egg producing and table bird production. Its high Vitamin A however produces a yellow fleshed bird, which Japanese customers prefer, though our supermarket buyers demand white; and in the USA geese reared on Comfrey, which makes them less greasy than normal, are also popular.

The three main handicaps of Comfrey in Britain are the fact that it is a semi-sterile hybrid, setting so little seed that it must be established from offsets, the risk of infection from the rust of our native Comfrey—though the resistant variety Bocking No. 14 and the systemic fungicide Benlate are making this less important—and the fact that it must be cut and fed from a clean cultivated plot rather than grazed in grass.

At present one of its major uses in Britain is as a source of potash rich "instant compost" for amateur gardeners, for it is so rich in nitrogen that it is compost before it goes on the heap. The medicinal principle Allantoin, in Comfrey is important in herbal treatments, and an ointment made from it is valuable in healing many awkward skin conditions. But the future of this fastest fodder crop so far known will be as a vitamin and protein source for a world that may well be hungrier when the crowded countries develop far enough to buy the food Lawrence D. Hills they grow.

Friends of the Earth

Endangered species campaign

On March 3rd 1973, the UK, along with 23 other countries, signed a Convention drawn up by the International Union for the Conservation of Nature and Natural Resources (IUCN) to regulate the trade in endangered species of wild animals and plants. The Convention will control, by a permit system monitored by Scientific and Management Committees, the import and export of live animals, any "readily recognisable part or derivative" obtained from these animals and plants.

There are three lists of animals: Appendix 1 relates to species which are already considered to be threatened with extinction. Trade in these species is strictly controlled. Appendix 2 relates to species not immediately in danger, but which need protection. Trade in these species is carefully regulated. Appendix 3: any member states can add their own indigenous animals/plants to this appendix if they feel they are in need of protection.

The Convention also covers "introductions from the sea", i.e. species which are outside territorial waters. Five species of whales already protected by the IWC are listed.

Implications and Action by the UK

The UK already has ways of controlling traffic in wildlife:

- 1. Animals (Restriction of Importation) Act, 1964. This Act covers live animals and not their products.
- 2. Open General Import Licence. Under the Import, Export and Customs Powers (Defence) Act 1939, which was later amended by the Import of Goods (Control) Order 1954, the Department of Trade and Industry (DTI) has powers to stop virtually overnight the import of any product. Vicuna hair and skin were banned in October 1970, and tiger, snow and clouded leopard skins, rugs and coverlets (with restrictions on the import of leopard and cheetah skins) were banned under these Open General Import Licence regulations in March 1972. The im-

port of certain whale products was banned in March 1973.

A comprehensive act regulating the trade in endangered species (dead and alive), insects and plants is desperately needed. This is what Britain has essentially committed herself to by signing the IUCN Convention. The Convention, as such, has no teeth unless the signatory nations introduce domestic legislation to give it meaning.

FOE, with the aid of a Parliamentary draftsman, has drawn up the first draft of an Endangered Species Bill. Our aim was to get it introduced as a Private Member's Bill. However, now the Government is committed to drawing up its own Bill, we feel that our time could be spent more effectively seeing that the Government introduces suitable legislation.

The Department of Education and Science (DES) is the Government body responsible for overseeing this. So far, they have set up an inter-departmental working party to look into the implications of the IUCN Convention. It would have been preferable if they had done this before signing the Convention, and not after.

We have been told by the DES that legislation will take at least a year. By the time it is finalised many of the species listed on the Convention could have been wiped out by traders who are eager to "beat the ban". We feel there are three ways in which action can be taken by the Government to prevent this:

- 1. That the animals covered by the IUCN Convention which are not already included in the Schedule to the 1964 Act be automatically added to the Schedule.
- 2. That the 1964 Act be amended to include the products derived from the animals included in the IUCN Convention. (This might take time though).
- 3. That "any readily recognisable part or derivative" from the listed animals be subject to the Open General Import Licence restrictions. Please write to your M.P. asking him

when legislation will be introduced, and

what preventive action will be taken by the Government to avoid a beat the ban rush whilst legislation is being drawn up.

For background material on the reasons for the campaign and ideas for action, write for our Action Guide and our Endangered Species Campaign Manual (the latter priced at 10p including post and packing).

Angela King

P.S. And now, with a funfare of sackbuts, krumhorns and dustbins, the longawaited FOE Report, *Packaging in Britain: A Policy for Containment*. Crammed to overflowing with everything you wanted to know about packaging, including why not. A handsomely produced treatise, a throwaway at 50 frozen p's plus 10p postage and overpackaging.

P.P.S. Patricia Rambach of the Sierra Club gently points out that FOE is not "... the only political activist environmental movement in the world to have been granted NGO status" (February Newsletter); there are others, among them the Sierra Club. The Sierra Club has offices in Geneva, Rome and Nairobi, the better to keep in touch with the UN, and has embarked upon a major international programme. Our apologies for the unintended slight; the more of us there are the better.

P.P.P.s In the May Newsletter we said said the amount spent on National Parks was 7 per cent of the £50 million subsidy to the mining companies. The figure should be less than 1 per cent.

Aid for inquiries

A new service is beginning that may be of great value to local groups taking part in public inquiries. The aim is to collect information based on the techniques and experiences of amenity groups at previous inquiries and from this to provide guidelines. Initially, the service will be restricted to inquiries regarding trunk roads, urban roads, industrial pollution, large-scale development in rural areas and inner city developments.

Groups or individuals who would like more details of the scheme should contact D. Gould, 78 Gwendolin Drive, Countesthorpe, Leics., telephone Glen Parva 437.

Books

National health . . .

CHALLENGES FOR CHANGE: ESSAYS ON THE NEXT DECADE IN THE NATIONAL HEALTH SERVICE, edited by Gordon McLachlan. 301 pp. Oxford University Press for the Nuffield Provincial Hospitals Trust, London, 1971. £3.00.

The administrative structure of the British National Health Service (one of the largest civilian organisations in the world) is being re-organised. From April 1st, 1974, all health services with the important exception of environmental services—will be brought under the new area health authorities (A.H.A.'s.). There will be one A.H.A. for each new county and metropolitan district.

The essays in this book are all set against the background of this impending administrative change. But, as is acknowledged in the introduction, it is one thing to change management structures and quite another to change the underlying strategy for the improvement and protection of health. Many of the essays aspire to tackle the strategic issues but usually collapse back into a consideration of committee and executive structures and processes. There are essays on the quality of "health care" (read: medical services), the hospital and general practitioner services and on various functions of the new area (county) and district administrative headquarters.

Many authors confer a mystic inevitability on the development and

deployment of more specialised and expensive hospital treatments. Thus, the introduction refers to "the accelerating demands of medicine and particularly now of medical technology". How, pray tell, can "technology" demand anything? It is human beings that demand. A surgeon has visions of "the shape of a system towards which the logic of events must force us" (my italics). This includes district general hospitals serving "a community of approximately half a million inhabitants". (Such hospitals would be likely to have around 2,000 beds.) "Perhaps, like the American supermarket, hospitals should be at the periphery of towns, with access to urban motorways, and with adequate provision for car parking." These hospitals would, no doubt, be especially handy for those among the elderlyfor it is the elderly who use hospitals most-who are both keen motorists and able to afford the rising price of petrol.

Several authors are concerned about the unreasonableness of public objections to the centralisation of hospital facilities. The surgeon believes that a



Rachel Carson at Work Paul Brooks

Rachel Carson can truly be said to be responsible for one of the great revolutions in history—the Ecological Movement. In her world-famed book, *Silent Spring*, she fearlessly and scientifically exposed the abuses our house of life was exposed to through the uncontrolled use of science. She died eight years ago before the full impact of her work was felt.

This book is a literary biography and a reader based on her papers and books, published and unpublished. It includes 'Undersea', her first nationally published essays and selections from Under the Sea-Wind, The Sea Around Us, The Edge of the Sea, The Sense of Wander and Silent Spring.

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GEORGE ALLEN & UNWIN

"more positive approach is needed to show the public... the advantages of the district general hospital concept". "A little money spent on local information, utilising the regional press and radio, would help to integrate it into the community."

One of the more sober articles is by Alex Gatherer, Medical Officer of Health for Berkshire. He is rightly concerned about the possible weakening of environmental health services within the new administrative structure and advocates "regional units of human ecology". These would bring together doctors concerned with population approaches to the improvement of health (now called "community physicians"), senior public health inspectors (who will in future be working outside the N.H.S.), and the public health laboratory services. I would have added population biologists-for none of the above has any real understanding of the nature of ecological systems nor of the delicacy of man's relationship with his environment.

There is much hand-wringing in these essays but few reach out to grasp the nettles. Of course it is true that if we put more effort into "bigger and better hospitals" some lives will be saved that would otherwise have been lost. But if instead we were to channel our effort into changing those elements of our way of life that burden us with the diseases of civilisation, then a much greater number of lives would be saved. Why is the one kind of effort presented as an inescapable duty and the other all but ignored? The "technological imperative" is a refuge for moral cowards.

John Powles

... and world health ?

DEVELOPMENT OF ENVIRON-MENTAL HEALTH CRITERIA FOR URBAN PLANNING: RE-PORT OF A WHO SCIENTIFIC GROUP. World Health Organisation Technical Report Series No. 511, pp. 35, Geneva, 1972. £2.00 (available from H.M.S.O.)

Cities are the most man-managed parts of the world's surface. They are

often—increasingly often—unsympathetic to the needs of the human organism. But the group of international experts who prepared this report believe that a solution to their environmental health problems is to be found in a straightforward intensification of man's management of his environment:

"Environmental health is concerned with the control of all physical, chemical, and biological processes, influences, and factors that exercise or may exercise, by direct or indirect means, a significant effect on the physical and mental health and social well-being of man and his society." (p. 6)

This approach seems a little foolhardy.

The authors identify what they see as the most important environmental health factors in urban planning and note some available environmental health criteria and how these might be better applied. They are conscious of the inadequacy of current knowledge and of the great need "to establish new and additional environmental health criteria"—especially



relating to the impact of man's built environment on his health and wellbeing. There is much useful advicealthough some of it is rather trite. Do we really need a group of international experts to tell us that: "Built-up areas, particularly residential areas, should not be subject to flooding, even at infrequent intervals." (P. 9): or that "... persons responsible for the planning of metropolitan areas should consider radiation protection problems when deciding the location of nuclear energy reactors and their associated chemical and engineering facilities in or near metropolitan areas." (p. 21quoting from an earlier WHO report.) The will to human mastery makes one important concession: "From recent biological research, scientists have concluded, however, that extermination of rats is probably impossible." (p. 23)

The general approach is one common to non-ecological discussions of "environmental" problems. Adverse elements in man's environment that are the result of specifically human activity (e.g. agriculture and industry) are collapsed together with those adverse elements that are natural to the biosphere-the whole constituting "the problem of the environment." Man's past mistakes are thus externalised-and then taken as evidence of the need for further effort to dominate the biosphere. It would be wiser both to acknowledge frankly the man-made character of most of these problems and to show more respect for the complexity, subtlety and vulnerability of the natural systems on which man is dependent for his welfare.

The lesson remains to be learnt. The new B.Sc. course in Environmental Health at the University of Aston in Birmingham, which is intended to train public health inspectors, has a mere 10 per cent of its teaching time allocated to biology. In the final examination, "Environmental Science" is taken to consist of "air pollution control, applied science, health physics, building services and public services".

John Powles

Europe 2000

FEARS AND HOPES FOR EURO-PEAN URBANISATION: EUROPEAN CITIES, Martinus Nijhoff, £3.90. THE RECURRENT CRISIS OF LONDON. CIS ANTI-REPORT ON THE PROPERTY DEVELOPERS. Counter-Information Services 60 p.

The first of these two very different reports is an attempt at a grand futurological survey, by a selection of well-known people, on how they (supposedly) want European urban society to be in 2000.

With important exceptions, the. lustrous contributors fail to do more than recap on conventional views of existing trends, and cosily look forward to a Europe little different from official views of great US cities: symbols of consumerist progress. The introduction cautions against viewing cities as something like "a drab smokey downtown area with congested traffic, street corner muggings, and stores having liquidation sales." (Gt Britain Ltd?). No, the city doesn't have to be like this-it can also be "the bungalow park and the dormitory urban fringe". Here the two dominant strains of urbanism surface: the downtown nightmare and the suburban dream multiplied by 100 million.

Few of the contributors are able to grasp the awfulness of our present cities. Edward Mishan can, and he says so: "By any humane standard, and with a few exceptions, existing urban and suburban environments are a disaster." Another realist, T. Malmberg, in his thoughtful paper "Biological Man in future urban Europe" states that there are three roads to the future : "the first is broad, with no speed limits...no planning, and no hope. This is the way to increasing catastrophe and final desolation of the continent." This is the present course. The second, which in his view will produce the same disasters, is through

conventional planning—which in Britain means selling out to the highest bidder, whether motorway or millionaire. The third he sees as one where planners grounded in ecology and ethology are allowed to get to grips with the air-conditioned nightmare.

Unfortunately we are a long way down Malmberg's first road, and very few planners, seduced by their power to smash down neighbourhoods and erect vertical, concrete slums, would appear to recognise this. As we know from the energy, pollution, and human crises that are now so manifest, it is time to rid ourselves of delusions and take a sharp side turn in the road of urban history.

The report by CIS has no time to ponder and pontificate on the metaphysical attributes of cities-it coldly analyses the property carve-up that promises a 1984 London years before schedule. Smartly soi-distant "socialist" boroughs are revealed as more capitalistic than the tycoons they cultivate, sweeping away a community, here for an office block, and there for a sparkling motorway. And always at a profit. Compensation is no longer through suggesting cake-eating, but by offering crisp new windtunnel arcades where property tycoons' friends can flog their flotsam to rehoused cattle.

Strangely, the developers' blitz may offer sufficient open space for allotments, greenhouses, and other elements of "street farming" that could play a part in stable lower-density "Ecopolises." However, the street farmers will have to buy out Joe Levy and friends if they want the land before the economic system collapses.

The CIS report is an example of what we so badly need: concise factual data. Significantly, it has to be anonymous.

Andrew MacKillop

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Letters

Bio-Strath

Sir,

I write with reference to the article entitled "Bio-Strath may be good for you" by Peter Bunyard, published in the February 1973 issue of the *Ecologist*.

Your article appears to me to be too one-sided. I object to the appearance of an article on a highly commercial product in the manner your magazine chose to portray it. I found the article appeared to be the product of a well organised public relations exercise by Messrs. van Straten and Pestalozzi. Friedric Pestalozzi is wise, in my opinion, to play down Bio-Strath's "power"—it is a pity that those he attempts to influence do not do the same.

Certainly the *independent* tests conducted by the Consumers' Association tend to throw some doubt as to the usefulness of this highly expensive product. It is definite that the Association found nothing extraordinary about the concoction of yeasts and herbs called Bio-Strath.

During 1970 the Consumers' Association investigated this product and published its findings in the November 1970 issue of the Association's magazine, *Which*?

The report covered the following points:

1 Advertising

It features well known people like sportsmen who back Bio-Strath up to the hilt.

It is implied that even if one cannot represent one's country in a particular sport, they can be as healthy as the featured personality is.

This type of advertising is misleading in my opinion.

2 Health

The pack and accompanying leaflet makes many more or less vague claims without presenting any evidence to support them. One makes the assumption that the reason for the claims is to be found in the properties of some of Bio-Strath's ingredients; Enzymes, Vitamins, Minerals and Amino Acids which are listed in great detail.

- 3 Ingredients
- 3.1 *Enzymes:* These have no special value in the diet—they are broken down before being taken up by the body.
- 3.2 Vitamins: Vitamin deficiency is not a problem to the vast majority of Britain's people. Those that do suffer from this deficiency are likely to be eligible for free or cheap vitamin supplements, eg. expectant mothers and babies. Others may require vitamin supplementation but could not afford Bio-Strath in any case, eg old age pensioners.

Too much in the way of vitamins is a waste because the body rejects unwanted amounts, and in any case vitamin deficiency is not always related to diet and so should be the province of one's medical adviser.

The report stated that Bio-Strath's vitamin content was no more than a thirtieth of one's daily requirements of any one of the 10 vitamins then listed. For example, there were about five times as much vitamin C in one potato chip as in the daily dose of Bio-Strath.

- 3.3 *Minerals:* Again much as was said for vitamins applies here. Deficiency is unlikely except in iron and calcium and in the event of this happening one's doctor can prescribe accordingly. Bio-Strath was found to contain very little in the way of minerals.
- 3.4 Amino Acids: Nothing special was found about Bio-Strath's amino acids. They only indicated an exceptional and very modest protein content. The report stated that ounce for ounce, cheese gave you 10 times as much.
- 4 Energy

One specific claim made by Bio-Strath was that it gave energy. No calorific value was given in the literature supplied by Bio-Strath but the Association calculated the value to be about 40 calories a daily dose—about the same as a cup of sweetened tea.

The conclusion of the Consumers' Association was:

"Whether or not you are eating a reasonable diet, the food value of a daily dose of Bio-Strath is irrelevant. It all depends whether you think there are fairies at the bottom of the bottle."

I look forward to your comments with interest.

Yours faithfully,

D. G. Waller, Hawthorne Cottage, 76 Mold Road, Buckley, Flints.

Peter Bunyard replies:

I think there is little point in your taking up cudgels with me over Bio-Strath; rather you should argue it out with anyone of the various people I mentioned in the article—Professor Fritz Niggli, Head of radiobiology in Zurich, for example, or Drs John Ireson and Conway—who are no less independent than the Consumers' Association.

One point: how can the Consumers' Association be so sure that by taking apart a complicated product and analysing it for vitamins, minerals, amino acids and what have you they can describe its nutritional properties? Do you or the Association believe that by analysing the top inch of soil for its chemical constituents one can come to any serious conclusions about the milliards of micro-organisms that inhabit that top one inch?

You might be interested in Dr Michael Crawford's work on ruminants in which he shows that cattle fed on different diets and living under different conditions have grossly different constitutions. And if cattle why not yeast? Moreover the link between cardiovascular disease and intensively reared beef is not such a tenuous one.

I fail to understand your comment about vitamin C? Who would contemplate eating yeast extract for vitamin C, or a peeled frizzled potato chip for that matter?

Technology v. nature

Sir,

I must take issue with your contributor Henry Skolimowski (*Ecologist*, March) on his inference that "we know the Renaissance discovered perspective".

Some of us know nothing of the kind. The principle of perspective, as with so many other aspects of culture and discovery and even of invention, was not unknown to the Ancient World and was certainly practised in Hellenic times as in the ordinary proportions of Greek statuary and especially in the Roman murals still extant today. I have been particularly impressed by the vivid perspective effect of a small fragment, some six feet square on view in the museum at Ampurias, S. Spain; but there are countless other examples.

The gist of Skolimowski's article is both informed and inspiring, especially his references to a symbiotic relationship with nature. Very relevant mention might have been included of the "discovery" by Democritus, c. 200 BC, of the principle of atomic disintegration-nuclear fission-which as with similar ideas of the times remained, as your author so cogently remarks, a mere intellectual exercise; and the prospect of ever having to put it to the test in terms of technological practice would have seemed both repugnant and ridiculous. It has often been asked me why the Greeks never invented, say, the bicycle-or at least its forerunner the hobby-horse-after all "they had the wheel": the answer being that they would have seen no purpose in it. Necessity may not after all have been the mother of invention, but as we are only too clearly having demonstrated for us today, the other way round. One can scarcely visualise the inhabitants of the civilised Europe of the eighteenth century milling around clamouring for the "discovery" -or in view of the Greeks having already "discovered" it the "utilisation on a commercial and technological basis"-of steam-power to save their having to work so hard with hands or feet; or our mid-nineteenth century cavalrymen and coach-drivers demanding the invention of the internal combustion engine in order to relieve them of the continued exploitation of the four-legged producers of horsepower.

Yours faithfully,

D. L. Deere-Jones, Little Abbey School, Liss, Petersfield, Hants.

Institution of Environmental Sciences

Sir,

This Institution is now carrying out a survey of current and anticipated provisions at establishments of higher and further education and at schools in the field of education in environmental subjects. A substantial proportion of these establishments have already replied and the information supplied is now being analysed.

May I approach, through the courtesy of your columns, those interested in "environmental education" at various levels to submit private communications of relevance. The aim of this particular exercise is to sample intelligent public opinion outside the official institutions.

Yours sincerely,

J. Rose,
Director
The Institution of Environmental Sciences,
14 Princes Gate,
Hyde Park,
London SW7 1PU.

Subjective classifications Sir.

Edward Goldsmith's emotional slip is showing! He cannot claim scientific objectivity and at the same time talk of being "guilty of subjectivity" "merely a subjective (classification)" (my italics). He suggests that the subjective concept of fatigue is of doubtful value because "what a man says he feels, any psychologist will tell us, is not a reliable guide to his physical state." (He actually separates the two statements, thereby giving the impression that the subjective concept is of doubtful value per se.) There is also an assumption underlying what any psychologist is expected to tell us -namely that it is only a man's physical state that we want to know. One could much more reasonably expect to know something of a man's subjective state from his statement of what he feels and it is most subjective of Mr Goldsmith and the prototype psychologist to assume this is any less worth knowing than a man's physical state. Besides, Mr Goldsmith had just quoted George Wald as saving: "The most rigorous operation for determining fatigue seems to be to ask a person whether he feels tired".

There seems to be an extraordinary

predeliction among those who identify themselves (subjectively) as scientists for regarding subjectivity from all other possible standpoints except its own. When will they stop making most un-scientific jibes about subjectivity, stop limiting "*truly* scientific purposes" to "building an effective model" and try to become more objective about their own and other people's subjective experience. With the disposal of a few sacred cows we might then have the beginning of a subjective science.

In the meantime people might be well advised to retain the "plethora of subjective concepts"... "such as 'mind', 'consciousness', 'memory' etc." They may be of real use. I, for one, find my definition of mind highly effective and crucially important to my well-being.

Yours faithfully,

Jim Scott,

Elmwood Group for Human Ecology, 150 Camberwell Grove, London SE5.

Environmental legal aid Sir.

I refer to "Comment"—Environmental Legal Aid—in the February 1973 issue.

I believe you are doing a very good service to publicise this proposal, for it has been my experience that responsible and professionally mounted objection to the "planners" can succeed at Public Inquiries.

In 1968 the electricity authorities of East Sussex made public their proposal to erect an overhead line on transmission towers about 130 ft high through about 18 miles of countryside originally landscaped by "Capability" Brown, and subsequently the inspiration of the painter Turner, between Ninfield and Crowborough. They had already received official approval from the East Sussex County Council and the three Rural District Councils involved before publishing their intentions in the local press; and exceptionally strong feelings were spontaneously aroused all along the proposed route. By various democratic and even medieval processes (by nailing a notice signed by six parishioners on the church door a public meeting may be convened) an organisation was launched, to be known as the East

Sussex Anti-Pylon Committee, to fight this threat to unique and unspoilt countryside; and subsequently a Public Inquiry was ordered.

The Committee did not seek to oppose the transmission of much needed electricity, but its slogan was "Electricity yes, pylons no" which I think explains its aims, to challenge the Board's constant use of overhead lines at all times, regardless of the quality of the landscape involved. This was regarded not just as a parochial matter but a national one, since our research showed that previous objections in this country had often been in the form of suggestions for alternative overhead routes, presumably on the assumption that underground cabling would never be sanctioned because of increased cost. The E.S.A.P.C. resolved however to challenge this entire concept, and to submit that unique and beautiful countryside should have money spent on undergrounding to preserve its character and charm-anywhere, not just in East Sussex.

The Committee felt it faced an uphill fight, since the County Council and the R.D.Cs would not withdraw their approval to the overhead route, neither had they in the past designated the area as being of any special beauty on County Plans. Also, various important individuals and establishment foundations and societies were discouraging, to the point of "not wanting to be involved".

Raising money to present our case adequately took considerable time and effort, but the response was ultimately magnificent. This may perhaps best be judged by the fact that our solicitors were able to brief Counsel, an Economical Analyst (the same used in Stansted by the objectors), a Past-President of the Institute of Landscape Architects, and a consulting Electrical Engineer. I think in all some £2,500 was raised (1968 values) and the hearing lasted four days during which time all who appeared received the utmost patience and courtesy from the two Inspectors from the Ministry of Power and from the Ministry of Housing and Local Government (as they then were known). They subsequently recommended that some $6\frac{1}{2}$ miles of the route should be undergrounded (additional cost to the Board of about £11m.) and the (then) Minister of Power upheld this.

I feel this case must be considered in relation to its time—five years ago "environment", "ecology", "pollution" were words seldom used by the man in the street, and we were thought by many to be somewhat mad cranks.

Yet, because the cause was just and had merit, and the objectors were able to act responsibly and present their case in a sound and professional manner on a par with that mounted by the Electricity Board, no small measure of success was achieved.

Our group has continued in existence, basically to supervise the proper construction of the line, to press for Tree Preservation Orders and to maintain pylon screens, and to ask for new plantings to screen others to be implemented during Tree Planting Year. By wise investment of its remaining resources it has been able to assist others in need of encouragement and support in their fights against overhead lines, but only where they will press for undergrounding instead.

We are specially pleased that we are able to hand on valuable legal precedent, ie that undergrounding has been achieved when asked for; and we were delighted at the success of Berkshire and Cornish objectors who both more recently pressed for, and won, undergrounding.

It would have been wonderful to have qualified for E.L.A. instead of having to raise £2,500, but we would do it all over again if needed. Ashburnham and the Vale of Heathfield are uniquely beautiful, and grey hairs can be quite attractive!

Yours sincerely, Pamela Smith, Hon. Sec., East Sussex Anti-Pylon Committee, Trumpets Farm, Boole St. Green, Hailsham, Sussex.

Old Wives' tale

Sir.

I hasten to correct the erroneous impression created by a letter published in Vol. 3, No. 2, entitled Old Wives' Tale. In this the writer asserts that breastfeeding has no contraceptive value. Quite the reverse is true; this is attested by many clinical and demographic studies from all parts of the world. A list of these is available from La Leche League International, 9616 Minneapolis Avenue, Franklin Park, Illinois, USA, or from me. The contraceptive utility of breast-feeding is also widely confirmed by women who feed according to the suggestions set forth by La Leche League in our manual, *The Womanly Art of Breastfeeding*, available in hardcover from Souvenir and in paperback from Tandem.

Loss of confidence in the contraceptive effect of breastfeeding is in fact a New Wives' Tale and relates to the widespread use of supplemental bottles and early introduction of solids. Unless it is understood that only complete breastfeeding suppresses ovulation then the consistency of the effect may not be noticed. Studies show that few women in full lactation ovulate before the ninth month post partum and that in any case the first cycles of a fully lactating woman are sterile.

La Leche League is a reliable source of all information relating to breastfeeding as we represent the combined experience of many thousands of women and are able to call upon the advisory resource of an internationally respected panel of physicians. We also publish many pamphlets on problems not fully covered in the manual.

Most sincerely,

Joann S. Grohman, La Leche League, Lattenden Farm, Ashburnham, Nr. Battle, Sussex.

Religion and ecology Sir.

I can derive some amusement from the splendid nonsense of Mr Jason Wych's suggestion (February) that human sacrifice was "a simple balanced eco-system" but I am merely irritated by the paucity of his theological knowledge even if he has succeeded in spreading it across two-and-a-half columns of your journal.

It is certainly true that a Man-Nature antagonism has emerged from time to time as a characteristic of popular Christian belief during the last two thousand years but it is certainly not true that it represents anything more than a departure from an Incarnational Faith. The soul-body dualism may have been firmly grafted, via Greek philosophy and Eastern religion, into popular consciousness but

it has nothing whatsoever to do with the biblical doctrine of Man. Christ did not come to "save souls" but to redeem Creation (Romans viii 22). There are many theories of the Atonement which, indeed, have nothing to say about world problems but the oldest theory of all, called by Gustav Aulen, the "classical" theory and taught by many of the Fathers of the Church, postulates a "cosmic" Christ breaking the thraldom of Satan over the whole created order. The Christian hope, called in the Synoptic Gospels, the Kingdom of God, is not limited to the life hereafter but looks forward to the renewal of human society in Christ. "The Kingdoms of this world are become the Kingdoms of our Lord and of his Christ", says the Book of the Revelation, words which the late Canon Stanley Evans described as the representation of the social hope of the Christian Church.

The belief that Man was appointed a custodian of Nature rather than her predator is older than the New Testament. It is, as the Bishop of Kingston points out in his book. The Question Mark, part of the essential message of the Old Testament and the burden of the prophets of Israel. The Bishop writes that Man's dominion over nature "means that he must act as God's vice-regent ... he must exercise his powers in accordance with God's moral nature... Man not only has dominion over nature but he is part of nature according to the biblical picture. He is made of the dust of the earth and the future of man is seen in close connection with the future of nature."

I am not aware what Christian conferences on the environment Mr Wych has in mind when he states that these have failed to reach agreement but I am aware that my own Church-the Church of England-has made an encouraging contribution to the ecological debate in its widely-praised report published by the Church of England Board for Social Responsibility under the title of Man in his Living Environment. I am told that this report is still available (it was published to coincide with the Countryside in 1970 Conference) from the Church Information Office, Church House, Deans Yard, Westminster, SW1, price 45p. I recommend it unreservedly to Mr Wych and any others who believe that Christian belief and

a concern for the environment are uncomfortable bed-fellows.

Yours faithfully,

The Rev. Ian Henderson, Chaplain for Social Responsibility to the Bishop of Willesden. 100 Baileau Road, London W5 3AJ.

Sir,

I hope you will publish a reply to Mr Jason Wych's long letter in your February issue in which he criticises Christianity for being responsible for an exploitative attitude towards nature. His arguments do not stand up to scrutiny.

Firstly he deduces that as "most of the crimes against nature have been committed by Christian countries or by those under Christian influence" Christianity is therefore responsible. This is fallacious in the same way as would be a deduction that, as most murders are committed by married men, marriage is responsible for murder.

Next Mr Wych gives three reasons to explain why Christianity has an anti-nature tendency.

(a) "Theologically Christianity presents a Man v Nature picture". This is not true except in the sense that Christians are told to fight their own natural instincts of selfishness, anger, lust etc. This is nothing to do with Nature with a capital N. If Mr Wych refers to Chapter 1 of Genesis he will find after each individual creation the words "and God saw that it was good". This is the Christian's attitude to all God's creation—it is good.

(b) "Christianity takes a short term view of the world. 'Take no thought for the morrow' ". Anyone who reads the context of this quotation (Matthew 6 v25-34) will not discover anything of the attitude Mr Wych imputes to Christianity ie. Christians exploit nature for today's wants oblivious of future generations. In fact the passage is about living life joyfully now without undue materialist worries. "Look at the birds in the sky. They do not sow or reap or gather into barns; yet your heavenly father feeds them".

Can an ecologist really criticise this attitude? Were its ideals followed there would be no environmental problem today. (c) "Christianity is unconcerned with the world for there is a 'life hereafter'..." From the passage following that quoted, Mr Wych seems to find fault with Christians for opposing science. This has been true of Christians at certain times in history when they have felt threatened by science but it is not characteristically Christian. Even if it were it is not clear how an anti-scientific attitude is responsible for "an open-ended, uncontrolled society".

Lastly Mr Wych pleads for a return to a more refined form of Nature Worship. If he means respect for Nature then I endorse his plea. If he wants to make Nature his god I shall not be joining him but will continue to worship the God who created Nature.

Yours sincerely,

Peter Honniball, Ponds, Sear Green, Beaconsfield, Bucks.

Lead Pollution Study Group Sir.

A Fabian study group has been set up to identify the inhibitors of political action necessary to combat lead pollution.

Any of your readers who may be interested in this project are invited to contact the writer.

J. B. Thomas, c/o Fabian Society, 11 Dartmouth Street, London SW1H 9BN.

In our next issue

Nuclear power by Walter Patterson. How safe are nuclear power stations and what questions should you ask when they plan to build one on your doorstep?

Living off the sun by Andrew Mac-Killop. The earth's major source of energy is the sun. Should it be harnessed for man's use? Can it be?

Meditating beyond the self by Jim Platts. Do we live in a magical, rather than a religious culture? To what extent are our present problems the result of our view of the world and of ourselves?

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- critical review of ecological objectivity
- where films can be obtained
- purchase or rental price.
- length; color or black & white
- names of sponsor, producer, director release data
- intended audience

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