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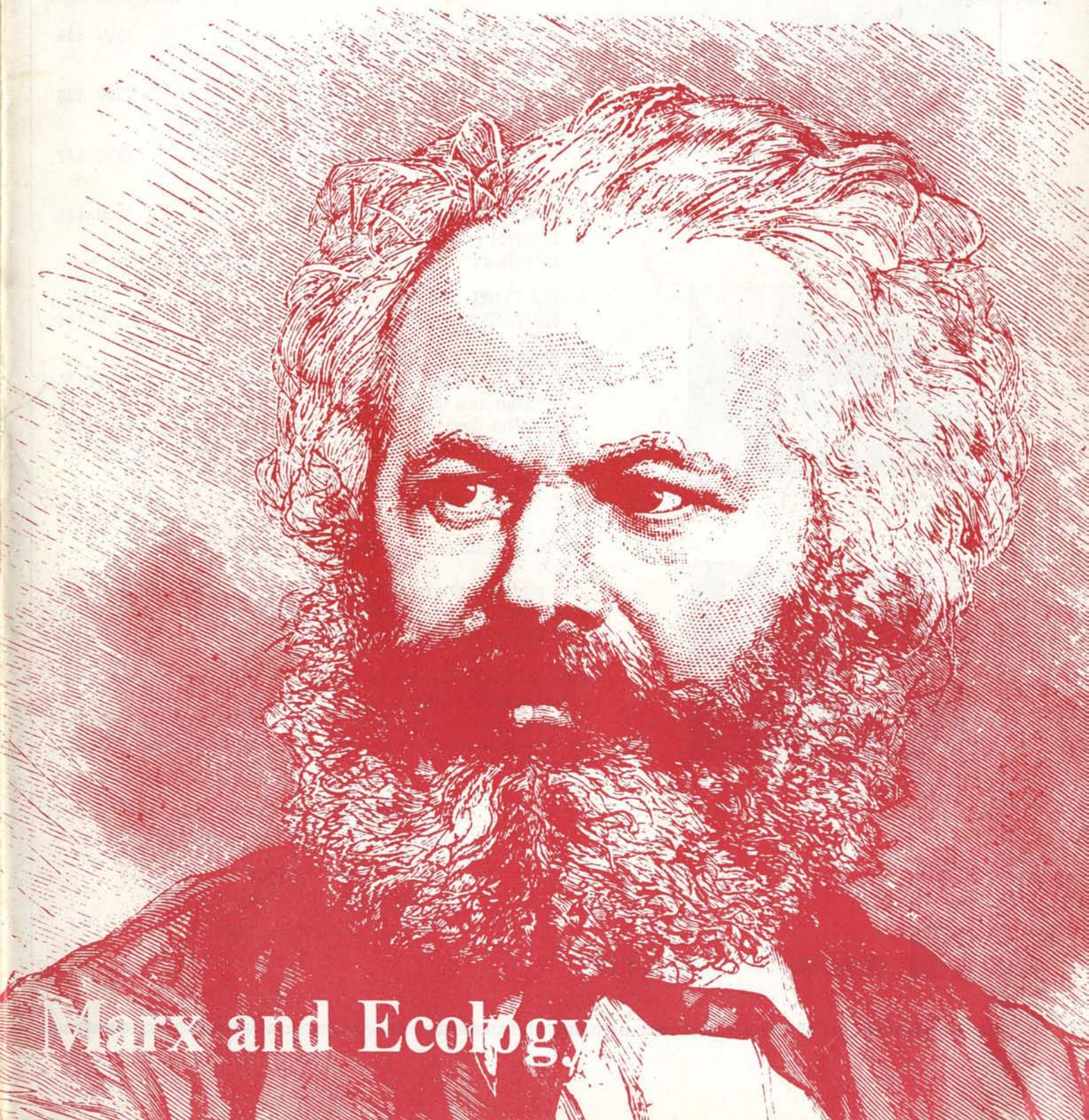
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Vol. 1. No. 16

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The Ecologist

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"So far so good!"

Editorial

So far so good

The experts assure us that current levels of lead in our air and water are safe. This is not the view of Professor Bryce-Smith who has amassed considerable evidence to the contrary. The other night on television he faced the experts. It was not a discussion between wise men in search of knowledge, but an inquisition: Bryce-Smith, the heretic was grilled by the upholders of orthodoxy.

What was striking was the bitterness and self-righteousness of the experts. They questioned his qualifications for discussing the problems at all. But what qualifications are in fact available in multi-disciplinary research? They questioned whether the material he had gathered in fact constituted evidence. But what is "evidence"? At no time was this key word defined. The attitude of the experts leads one to suppose that evidence, whatever it is, is something to be treated with very great respect, something almost holy.

In these circumstances, it may not be too bold to assume that "evidence" is something that confers on a proposition some measure of indisputability—perhaps even downright certainty. If so, how is this achieved? The answer appears to be on the basis of observations made during laboratory experiments.

A little reflection will reveal that such observations cannot provide any sort of certainty, and this for a number of reasons. Firstly, sensitivity to different pollutants will vary with every individual. Thus to determine with certainty what are the effects of a pollutant, such as lead, on human health, everybody ($3\frac{1}{2}$ billion people, 7,000 new ones every hour) would have to be tested. As this is not remotely feasible a first compromise is required: we must content ourselves with testing a *sample* of people, and we must assume that this sample is

representative. That this is so may be probable, but it cannot be certain, though the probability will undoubtedly increase with the size of the sample.

However, people do not on the whole volunteer to be the objects of laboratory experiments. This renders necessary a second compromise: non-human animals must be used instead of people; and we must make a second assumption: that people will be affected by a particular pollutant in the same way as are these animals. Though there is an astonishing similarity between different forms of life particularly at the cellular and molecular levels, this assumption forces us to make do with a still lower degree of probability. Of course this could be increased by using animals as much like ourselves as possible—chimpanzees, for instance, but these are expensive and are in any case well on the way to extinction mainly as a result of their high death rate in our laboratories. It follows that there must be yet another compromise: experiments must be carried out on easily available mammals such as mice, and probability is reduced still further.

However, even mice cannot always be used. The reason for this is obvious if we consider the minimum size of a satisfactory sample. Thus in order to test the carcinogenic effect of a chemical, we would have to take into account the fact that no more than one out of 500 people dies of cancer every year. If we regarded a one per cent increase in the cancer rate as tolerable, the acceptability of the chemical concerned could only be determined by testing it on a sample of 50,000 mice. This might be conceivable if only a few chemicals had to be tested; but our scientists are pouring approximately 1,000 new chemicals every year into our environment. To test each of these means increasing the number of mice required to about 50 million. If we wished to be thorough and test the five hundred thousand or so chemicals that have already been put into our environment, the number of mice required would be 25,000 million. It would be interesting to work out what would be the environmental impact of harbouring such a large number of mice in our laboratories. The sewage bill alone would be preposterous; thus if we assumed that one thousand mice produced as much sewage as one man, then our total sewage treatment bill which runs into hundreds of millions of pounds would

be increased by exactly 50 per cent.

There is another reason why mice will not do. The biological effect of pollutants is not immediately apparent. Cancer usually develops in man some 20 to 25 years after exposure to a carcinogenic agent; also increased sensitivity to such agents is almost certainly transmitted genetically. Thus such effects can only be determined over a number of generations. This rules out mice with generations of 6 to 8 weeks. Fruit flies are better with generations of two weeks, but even this means waiting too long to obtain a sufficient sample.

Thus two further compromises are necessary: tests must be carried out on organisms that have a smaller environmental impact than mice, and that have very short generations.

Dr Bryn Bridges of the MRC Cell Mutation Unit, Sussex University, has found that hamster cells cultivated "in vitro" best satisfy these requirements. To argue from hamster cells to people, however, must involve a still further reduction in probability.

Synergistic Effects

We are still assuming that chemicals and other pollutants will have the same effect on us in different combinations as when afflicting us separately. In fact, the opposite is probably true. Thus the effect of cadmium is much greater on people suffering from a zinc deficiency. The effect of radiation is much more serious on people subjected to air pollution, as became apparent when studying the incidence of lung cancer among smoking and non-smoking uranium miners. However, to test every possible combination of 500,000 chemicals, not to mention all the other pollutants in our environment would require such an enormous number of hamster cells that it is unlikely that our planet would stand the weight. Thus regardless of the organism on which we choose to carry out our experiments we are forced to make yet a further compromise: we must be satisfied with a sample of all the possible combinations.

However, we are still left making a very dangerous assumption: that observation is a precise, mechanical process providing one with objective information. It is only on this assumption that induction and hence experimentation can be regarded as the correct means of acquiring scientific

knowledge. Observation, however, is highly subjective. Wittkin, in his book *Personality Through Perception* demonstrates that what people observe actually provides more information on their personality than it does on the objects they are observing. Observation is, in fact, the work of the brain. It involves formulating a hypothesis to interpret a particular pattern of lines and shadows detected by the eyes, and different people are likely to formulate different hypotheses, and will thus see different things.

In addition we are still assuming that the correlations observed in laboratories constitute bona fide cause and effect relationships. Thus we observe the presence of a pollutant and a particular biological effect and assume that the former causes the latter, but it could, conceivably, be the other way round. Or both could be the result of a third factor, or a variety of other factors, or, what is most likely, the relationship between the two, may be of a feedback

nature: both may be affecting each other or may be in mutual interaction with other factors. An example points to the naïveté of crude empirical correlations: Imagine an employee of a large company cherishing the desire to become its chairman. He might make the astute observation that chairmen of large companies owned Rolls Royces from which he could infer quite justifiably (if naïve correlation is regarded as a valid means of obtaining knowledge) that all he had to do was to buy a Rolls Royce and his most cherished dream would be realised.

Empirical correlations cannot, by themselves, constitute evidence, and it is about time our experts realised this. A Scientific proposition must be based on a model. Its value, or the extent to which it constitutes evidence, must depend on the capacity of this model to represent the world. This it can never do perfectly since the number of factors influencing any given situation in the world are infinite, whereas models, re-

gardless of the informational medium used, can only take into account a very limited number of factors.

It is only by basing our behaviour on the best available model, regardless of its deficiencies, that we can maximise our chances of survival and such a model, I am sure, would favour Professor Bryce Smith's thesis rather than that of the experts.

Four thousand people died from the London smog of 1952 before the Clean Air Act was passed. What sort of disasters are required to provide us with the "evidence" that current pollution levels are getting out of control? Highly trained scientists are not needed to count the corpses and measure the pollution levels in their vital organs. Yet the fact that they are not at the moment being called upon to perform such tasks is the only grounds they have for stating that present pollution levels are acceptable. Indeed all that is implied by such statements is—so far, so good.

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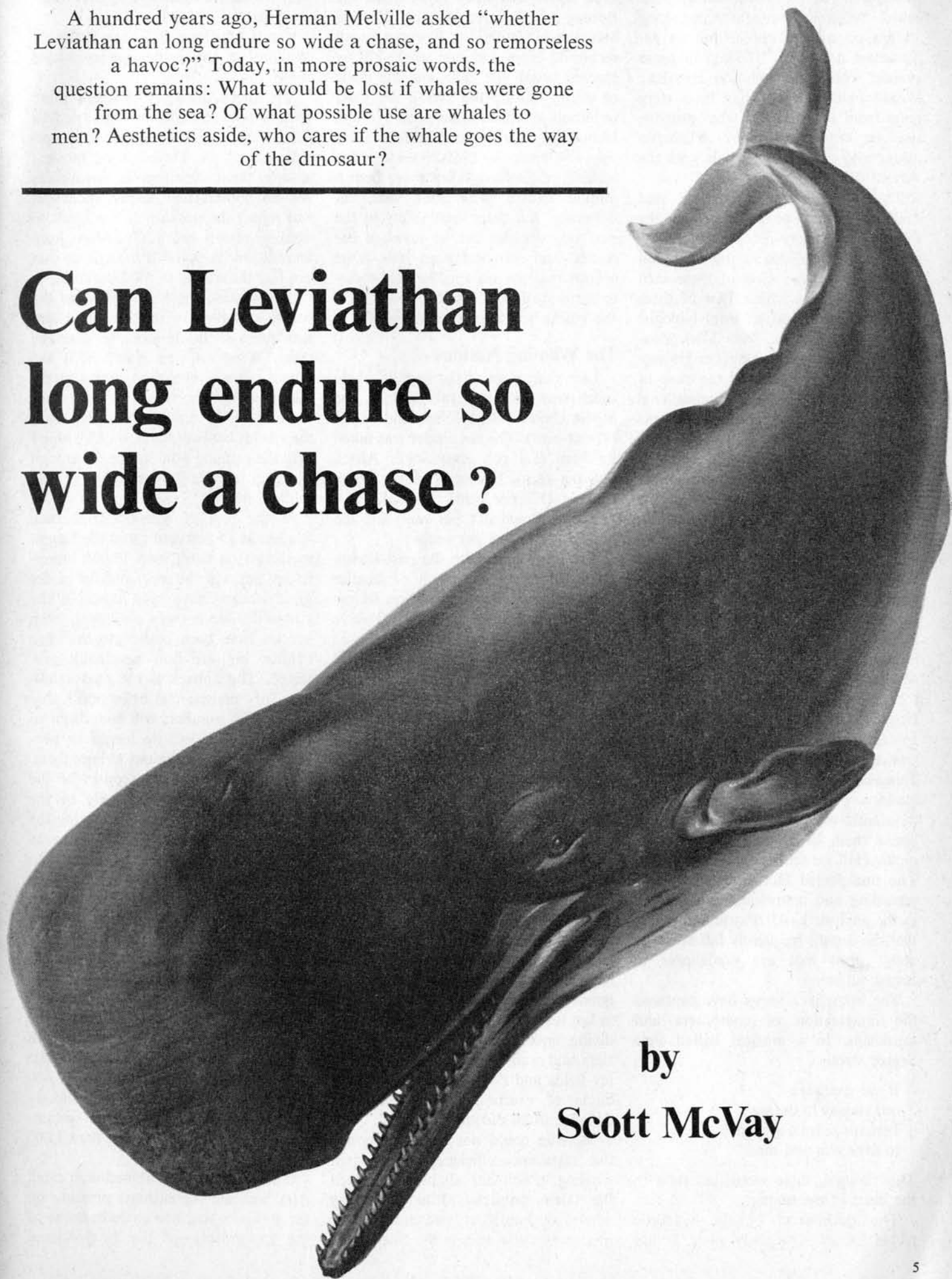
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A hundred years ago, Herman Melville asked "whether Leviathan can long endure so wide a chase, and so remorseless a havoc?" Today, in more prosaic words, the question remains: What would be lost if whales were gone from the sea? Of what possible use are whales to men? Aesthetics aside, who cares if the whale goes the way of the dinosaur?

Can Leviathan long endure so wide a chase?



by
Scott McVay

A hundred years ago, Herman Melville asked "whether Leviathan can long endure so wide a chase, and so remorseless a havoc?" Today, in more prosaic words, the question remains: What would be lost if the whales were gone from the sea? Of what possible use are whales to men? Aesthetics aside, who cares if the whale goes the way of the dinosaur?

These words sound terrible and ominous to me; yet they represent the thinking of many people, including some of the men who set the whale-kill quotas every June. Few of these men have ever seen a whale. Few of them had ever heard a whale until biologist Roger Payne, of the New York Zoological Society and Rockefeller University, played a recording at the close of the final session of the International Whaling Commission meeting on June 26, 1970, in London.

It was 2.00 pm and the commissioners were hungry. The chairman, Mr I. Fujita, noting at the outset of the final plenary session that business would have to be completed before lunch, pointed out brightly that "hunger will expedite our deliberations". But some delegates, notably the Japanese and Soviets, lingered to listen to sounds recorded at a depth of 250 fathoms—the song of the humpback whale. Spanning six octaves, it filled the conference room at River Walk House overlooking the Thames.

Henceforth the commissioners' annual deliberations will take on a new dimension. These sounds have already made a profound impression on the thousands of Americans who recently heard them in New York's Philharmonic Hall, on television, and on radio. The unexpected fact revealed by this recording and many others, according to the analysis by Dr Payne and me, is that the sounds frequently fall into true song forms that are predictable in broad outline.

The humpback songs have captured the imagination of composers and musicians. In a musical ballad Pete Seeger wrote:

If we can save
our singers in the sea
Perhaps there's a chance
to save you and me.

This thought, these words cut right to the heart of the matter.

The decimation of the antarctic whale fishery is a grisly story. It has

been catalogued since 1920, when the Bureau of International Whaling Statistics in Sandefjord, Norway, began recording every reported whale kill by species, length sex, date, and the place of death. During the 1960's the yield in barrels of whale oil dropped fivefold, from more than 2 million barrels to less than 400,000 in the 1969-70 season. The whalers might have taken more than a million barrels year after year, indefinitely. But their insatiability in the past two decades has so ravished the stocks and so decimated the large species that the sustainable yield today is but a shadow of what it could be if the stocks had a chance to rebuild.

The Whaling Nations

Last year, most of the world's whale catch was taken by two nations, the Soviet Union (43 per cent) and Japan (42 per cent). The remainder was taken by Peru (5.3 per cent) South Africa (2.8 per cent), Norway (2.5 per cent), Canada (1.7 per cent), Australia (1.4 per cent), Spain (0.8 per cent) and the United States (0.5 per cent).

The grim figures for the past season (1960-70) reflect the catch of smaller and smaller whales in the warm waters of lower and lower latitudes. Twelve years ago, 65 per cent of the catch was taken in antarctic waters south of 60° south latitude. Last season, 89 per cent of the catch was taken between 40° and 60° south latitude. In the heart of the antarctic fishery, once the most bountiful whaling ground on earth and a seemingly endless resource, the harvest has dropped in a dozen years from two-thirds of the total catch to one-tenth.

In the age of sail more than a century ago, when the whale hunt was directed principally at two species, the sperm and right whales, and the old-time methods were no match for the elusive and fast-swimming blue and fin whales, Melville could assert with dreamy eloquence: "The whale-bone whales can at last resort to their Polar citadels, and diving under the ultimate glassy barriers and walls there, come up among icy fields and floes; and in a charmed circle of everlasting December, bid defiance to all pursuit from man."

Melville could not have envisioned the rapacious efficiency of modern whaling, which has all but eliminated the rich antarctic fishery. Today whales are hunted at both ends of their migratory cycle and, in the case of the

sperm whale, on the way to the southern grounds.

Victor Scheffer deflates any notion of romance in the contemporary whale chase:

"In man's attempts to catch more whales more cheaply, he has tried to poison them with strychnine and cyanide and curare. He has tried to electrocute them. Spotters in aeroplanes and helicopters now search them out and report the position of the herds to whaling vessels below. The ships hunt them down by ASDIC, the system that can feel the whales in total darkness. A "whale-scaring machine" frightens the beasts into flight with ultrasound and tires them so the hunter can overtake them. What will be next? Will the hunter cut a phonograph record of the mating call of the whale, or the cry of the calf for its mother, and play back the sounds beneath the bow of his ship? Will the orbiting satellite speak through space to tell the hunter where to find the last whale?"

In the past 25 years, 62,022 blue whales, at 85 feet and more the largest mammals on earth, and 15,025 humpbacks, perhaps the most playful of the great whales, have been taken in the Antarctic. Never very abundant, both species have been pushed to the edge of life, but are now nominally protected. The finback is the next candidate for "commercial extinction", that is, when its numbers will have been so reduced that it will no longer be profitable to send expeditions to hunt them. The finback, a smaller cousin of the blue whale, was second only to the sperm whale in abundance. During the past quarter-century, 444,262 finbacks were taken in the Antarctic, more than half of them from 1954 to 1962 when more than 27,000 finbacks were taken each year. Their population is now estimated at 67,000 to 75,000 one-fourth of its original size. If the exploiters had shown restraint—if they had learned the lesson of the blue and humpback, had remembered the slaughter of the rights and bowhead in the last century—then the Antarctic could have yielded 10,000 to 12,000 finbacks a year down the long hungry road of the future. Today the sustainable yield is estimated at less than 3,000 finbacks.

These numbers, combined with catch data, indicate the extreme pressure on the finbacks and are an indictment of the stewardship of the International

Whaling Commission. The ravaged state of the whale stocks presents an essentially non-political problem that could be eased enormously if the catch effort was radically reduced to allow all whale populations to rebuild. The most desirable goal of all, a 10-year moratorium—for tagging, study, and population counts—seems beyond the capacities for co-operation and restraint of the nations present at the International Whaling Convention meeting: Argentina, Australia, Canada, England, France, Iceland, Japan, Norway,

Panama, South Africa, the Soviet Union and the United States.

With the stage set, we can better appreciate what happened at the 22nd meeting of the International Whaling Commission in London at River Walk House, last June. The actions and inactions of the commission can be gauged by four items: (1) the whale quotas set, (2) the sperm whale, (3) the International Observer Scheme, and (4) the action by the US Department of the Interior listing all great whale species as endangered.

The following great whales are ranked by their degree of rarity. The first group is protected. The second group is still hunted, but the herds are rapidly being depleted. Population figures are rough estimates.

Bowhead

Double spout, great curved jaw, bonnet; Eskimo still take a few every May; its numbers are unknown.

Right Whales

(2 species), so called because they were the "right" ones to kill in the nineteenth century; slow swimmers that floated after being harpooned; double spout, curved jaw, bonnet, barnacles; its numbers may be measured in dozens in a few remote areas.

Blue

Largest animal on earth, splotchy exterior, weighs as much as 1,500 men; its numbers have dropped from perhaps 100,000 50 years ago to a few thousand today.

Humpback

Most boisterous, breaches frequently, long flippers, unexplained knobs on head, great singer; less abundant originally than the blue, its numbers today are down to a few thousand.

Grey

Small rorqual, Korean stock not seen in years; following 30 years protection, the California stock has slowly recovered and now numbers 10,000-12,000.

Finback

Second largest of the baleen whales, fast swimmer, asymmetrical white marking on underside that overlaps right side of jaw; its numbers are estimated at about 100,000 today against about 400,000 formerly.

Sei

Third largest baleen whale, six times smaller than blue in terms of oil yield, its smaller, less numerous cousin Bryde's whale is also pursued; its members are at least one-half of what they were, 75,000 compared with perhaps 150,000.

Sperm

Only great toothed whale, square headed, corrugated body, harem groupings, diagonal spout, squid-eater, deep diver, found in all the oceans; most abundant species but its numbers are down to perhaps 250,000 from an estimated 600,000.

As an observer to the meetings, I would like to point out that while the United States is involved in whaling only marginally (it operates one small land station in California), the constructive influence of the United States on the commission has been considerable. Dr J. Laurence McHugh, the United States commissioner and vice-chairman of the commission, and Dr G. Chapman of the Center for Quantitative Science at the University of Washington, have in recent years chaired the commission's two principal committees, the Technical (McHugh) and the Scientific (Chapman).

In addition, the United States is a major importer of whale oil and whale products, making up roughly one-fifth of the world market. Hopefully this market may be closed if the whales can be kept on the endangered species list published by the Department of the Interior. Whatever the use of whale products, whether for lipsticks or lubricants, a satisfactory substitute is available in every instance.

Blue Whale Unit

On the matter of quotas, the Scientific Committee annually recommends that the blue-whale unit be eliminated. Under this curious and anachronistic arrangement one blue-whale unit is equal to one blue whale or two finbacks or two and a half humpbacks or six sei whales. Because it did not specify which whales may be taken, the blue-whale unit contributed to the collapse of the Antarctic fishery. Again this year the commission stuck by the invidious blue-whale unit in the Antarctic; in fact, the commissioners did not even raise the subject. The Scientific Committee (with the exception of the Japanese scientists, generally concurred that the sustainable yield for next season was 2,600 finbacks and 5,000 sei whales. The commission set a quota of 2,700 blue-whale units, which works out to be 27 per cent more than that recommended by the Scientific Committee. Even recognizing that Norway will probably not take the 200 units assigned to her, the quota does not allow any margin for the stocks to recover and probably will cause further depletion.

In the North Pacific, the Scientific Committee's studies revealed that the sustainable yield is 1,300 finbacks and 3,100 sei whales. The commission set quotas of 1,308 for the finbacks and

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4,710 for the seis. Worst of all, a fudge factor of 10 per cent—reminiscent of the blue-whale unit—was build into these numbers, so that whatever the whalers fail to catch of one species they can take in the other.

Regarding the sperm whale, the collapse of the antarctic fishery and the strain on the baleen whales in the North Pacific has meant that the damage inflicted on sperm-whale stocks—so far without any quota whatsoever from the commission—has been intensified each year. For more than 20 years the number of sperm bulls caught in the Antarctic has ranged between 2,500 and 7,000 annually, with higher numbers killed earlier and lower numbers recently. For example, the peak was 15 years ago when 6,974 sperm whales were reported taken, a catch that produced 342,000 barrels of sperm oil. During the 1969-70 season, 3,090 sperms were taken in the Antarctic for a production of 125,000 barrels of oil. The striking fact about these figures is that they reflect a steady decline in the yield in barrels of oil per whale over the past 15 years. The oil yield in the Antarctic has dropped alarmingly, from 49 barrels per sperm whale to 40 barrels. In a mere 15 years the sperm whales are 18 per cent smaller. The pattern of predation seems intractable.

The ecology for male and female sperm whales differs markedly. While the males attain lengths of 50-55 feet and more, the females are mature at 35-40 feet; indeed, females shorter than 38 feet in length are "protected" from pelagic whaling, while those less than 35 feet are protected from land station whaling. The catch data piles up at these minimum legal lengths lending credence to the general belief that the infractions are many and blatant.

The end of Sperm Whales?

An analysis and estimate of the sustainable or potential yield of the sperm whale in the North Pacific has been made by three Japanese scientists. They estimate the present sustainable yield of male sperm whales in the North Pacific at 4,290. The catch the past two years has been 12,740 and 11,329. The

Japanese scientists say that "this male sperm whale stock has... little or no further surplus". The population has been driven to a level of about one-half of its unexploited state. Privately, the North Pacific commissioners agreed to a catch 10 per cent below last year's. This catch limit-set provisionally behind closed doors outside of the formal business of the commission—is 240 per cent of the sustainable yield estimated by the Japanese scientists. The pattern of predation is familiar—as is the capacity of the International Whaling Commission to look the other way when the chips are down.

The most important single item on the agenda, the International Observer Scheme (IOS), was discussed at length. It was approved in principle seven years ago and has been piously reaffirmed annually. But no effective steps have been taken to implement it.

At the meeting, Dr McHugh stated that the commission's inability to implement an observer scheme weakens it as a conservation organization because it seems to lack the ability to enforce its regulations and quotas. The Japanese commissioner, Mr Fujita, said that his country would support the implementation of the observer scheme for the next Antarctic season and felt that the plan should extend to land stations as well.

The Soviet commissioner, Mr M. N. Sukhoruchenko, said that the IOS could be used at present with some small changes. He urged that two persistent problems be settled: every country has an obligation to send observers as well as receive them; the IOS will be effective only if implemented both for land stations and pelagic operations. He recommended that the commissioners meet on and settle this matter prior to the 23rd meeting in June 1971, in Washington.

Mr Fujita said that there was no basic disagreement on implementation, but that the commission did not have time to pursue the matter further.

All these words sound reassuring, but the IOS is still not implemented. A possibility exists that the United States and Japan may work out some modest form of exchange for their land stations that could serve as a model for other countries next year.

A beginning may yet be made. It is crucial to know when a protected species is taken and labelled something else; as, for example, when an imma-

ture blue whale, unmistakable because of its splotchy exterior, is harpooned and listed in the day's log as a finback.

Another example of the most egregious sort of violation of the regulations took place in the 1962-63 season when a factory ship and its catchers swept in on a small colony of "protected" right whales near the island of Tristan da Cunha in the South Atlantic. The few dozen rights, the largest grouping that had been seen in any ocean in years, was completely wiped out. This well-known incident has never been aired at the International Whaling Commission meetings nor has it appeared in print, but it is a tragic example of what happens in the absence of an International Observer Scheme. And there are many other unreported tragedies. Just talk to the whalers.

The meeting of the International Whaling Commission barely touched on the US Department of the Interior's bold action in placing all the great whale species on the endangered species list of June 2nd, 1970, implementing the Endangered Species Conservation Act of 1969. According to the provisions of the Act, no species that is demonstrated to be threatened with extinction may be imported alive or dead, whole or in part, into this country. By placing baleen whales, as well as the sperm whale, on the list the Department of the Interior went beyond the mere protection of species already struggling for survival. With the threat of economic boycott, perhaps the member nations of the International Whaling Commission will be spurred to take their task more seriously.

The Danger List

Until last November, a big question remained as to the chances of all these species remaining on the list. The sperm whale was especially vulnerable. Interior Secretary Walter J. Hickel was under great pressure from whale oil importers, from other departments within the government, and from overseas to drop the sperm whale from the list. On November 24th, 1970, after six months' intensive review, Secretary Hickel affirmed that all eight threatened species of great whales will be kept on the list and banned from importation to "prevent conditions that lead to extinction".

Explaining why the department kept the fin, sei, and sperm whales on the list, Hickel said it is "clear that if the

present rate of commercial exploitation continues unchecked, these three species will become as rare as the other five". He also called for a conference, jointly sponsored by the Department of the Interior and the Smithsonian Institution, to be held early this year to review what can be done to restore whale populations in the oceans of the world.

The Secretary omitted mention of one aspect crucial to any effort to save whales: funding scientific programmes to monitor the size of the whale herds and the United States share of an observer scheme both need financial support.

This break for the threatened whales was accompanied by some good news from Japan. Last August I went there on behalf of the Environmental Defense Fund and the New York Zoological Society, to discuss with Japanese scientists the initiation of a campaign to save whales. The scientists have formed a Committee for the Protection of Whales, chaired by Dr Seiji Kaya. Along with writers Kenzaburo Oe and Sakyō Komatsu, they have taken the whale problem to the public for the first time. They are urging the Japanese Government to curb whalers and to strengthen the powers of the International Whaling Commission.

The big question remaining is the Soviet Union, but we have prospects of positive developments there, too. The problem of the survival and continuity of the great whales would be eased if the Soviets extended to large whales the attitude they take towards the smaller dolphins and porpoises. In

March 1966, the Soviet government banned the catching and killing of dolphins. This decision was taken, according to Alexander Ishkov, Soviet Minister of Fisheries, because research has shown that dolphins have brains "strikingly close to our own". Dr Ishkov therefore, regards the dolphin as the "marine brother of man", noting, "I think that it will be possible to preserve dolphins for the sake of science. Their catch should be discontinued in all seas and oceans of the world".

May the song of the humpback whale soon sound in the Bolshoi Opera House.

We know very little about whales. Until a few months ago, for instance, we did not know that some whales sing, and that these songs make a profound impression on the human listener.

What we have seen closely of whales to date—and watched with strange fascination—are "death flurries", the tragic scene that has played to an inert, bloated conclusion 60,000 times a year for eight years (1958 to 1965) and now is down to 40,000 times a year. Today a whale is harpooned every 12 minutes on the average. The "life-flurries" are essentially unknown because no man has stayed with a whale pod hour after hour, day and night, week after week.

Melville concluded:

"Dissect him how I may, then, I but go skin deep; I know him not, and never will. But if I know not even the tail of this whale, how understand his head? much more, how comprehend his face, when face he has none? Thou shalt see my back parts, my tail, he seems to say, but my face shall not be

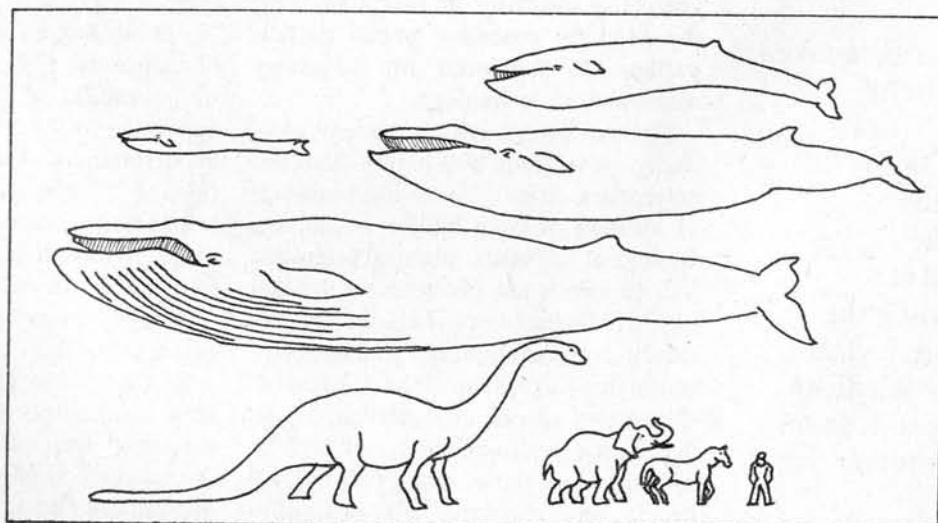
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seen. But I cannot completely make out his back parts; and hint what he will about his face, I say again he has no face."

As a species, man is at a point in his own evolution where he cannot yet create a flea but is wholly capable of destroying the whale. The job is three-quarters completed when measured by the great whale species that are threatened with extinction.

Our survival is curiously intertwined with that of the whale. Just as all human life is interconnected (in the Monkey-Rope situation in *Moby Dick*, Ishmael declares, "I say that this situation of mine was the precise situation of every mortal that breathes; only, in most cases, he, one way or other, has this Siamese connection with a plurality of other mortals...") so have we finally begun to perceive the connections between all living things. The form of survival itself, is affected as the variety and abundance of life is diminished. To leave the oceans, which girdle seven-tenths of the world, barren of whales, is as unthinkable as taking all music away and everything associated with music-composers and their works, musicians and their instruments—leaving man to stumble on with only the dryness of his own mutterings to mark his way.

Comparative sizes of whales, with a Diplodocus, an elephant, a horse and a man.



Towards an Adversary System of Scientific Enquiry

by Arthur Tamplin & John Goffman

Arthur Tamplin and John Goffman are both scientists working for the Atomic Energy Commission, and are the most outspoken critics of Nuclear Power programmes. They have recently shown that there is no safe level of radioactivity, and that if everybody received what is today accepted as a safe dose, there would be 30,000 extra cancer cases a year in the US alone.

They are currently pressing for a 30-fold reduction in "acceptable" levels and if this were agreed to, it might virtually put an end to further nuclear power production in industrialized countries.

They have encountered immense difficulties in putting across their case—as all vested interests—were inevitably ranged against them.

In this important article taken from their recent book "Poisoned Power" (to be published in the UK by Chatto and Windus Ltd.) they state the need for an objective means of determining the usefulness of technological developments—by scientists who have nothing to lose or gain one way or another.

The public has every reason to ask why the nuclear electricity industry developed this far before there was a widespread appreciation of the hazards. Why, the public wants to know, was it not warned much earlier that the Insurance Industry has no confidence in nuclear electricity generation? How did it escape public notice that nuclear electricity plants represent a gigantic experiment being conducted at the peril of life and property of citizens of the US? How does it happen that "standards" for radioactivity exposure (both for routine operations and in the event of accidents) are such as to lead to the expectation of massive injury in the form of cancer, leukemia, and genetic diseases?

The answers lie in the very nature of large-scale technology. One of the major characteristics is the careful exclusion of the public from all considerations and decisions. Technologies, such as nuclear electricity generation, espouse the principle that, "In such complex problems we must put all of our faith in the experts". The experts, for several obvious reasons will surely bring society to its doom, unless certain corrective measures are urgently introduced. We shall consider such corrective measures in two areas: (a) the need for extensive public participation, (b) the need for adversary assessment of technology.

Technologies, such as nuclear electricity generation are highly financed enterprises, usually involving hundreds of millions or even billions of dollars. Biological scientists, physical scientists, and engineers are necessarily attracted to such technologies, because the research and development job opportunities are excellent. The "experts" ultimately chosen to participate in decisions concerning safety, or lack of it, come from these same groups. They decide on "standards" for exposure

of the public to such by-product poisons as radioactivity.

It is axiomatic: scientists chosen in this way are not likely to make decisions that embarrass their technology. And adverse decisions concerning its hazards can compromise the technology. A "standard-setting" decision that can make the technology itself appear economically unattractive might wipe out a scientist's financial support. Consciously and sub-consciously, the scientist has a strong motivation to make the technology look good. The result, in general is that the public bears the burden of any hazards, actual or potential.

Such scientists and engineers are not evil in their intentions. However, they are often so thoroughly compromised in outlook that their search for hazards can best be characterized by minimum, sincere diligence. At every step in their deliberations, where they must choose, the choice is that which minimizes the hazards estimate. Precisely the opposite choice should be the case if public health and safety were truly of paramount concern.

One product of such scientific deliberations is the concept of an "allowable", or "tolerable", or "permissible", dose of a poison such as radioactivity. Never has anyone proved that any dose of radioactive poison is safe. Yet bodies of scientific "experts" are duly appointed to "standard-setting" boards or committees. Under the auspicious title of "Radiation Protection", such committees proceed to ordain how much radioactive poison the public must accept in order to allow for "the orderly development of the technology (atomic or other)".

In the course of their deliberations these committees recite the benefits of the new technology and state that society can ill-afford to forego them. Next they estimate the hazards, with all

uncertainties weighted for the technology, not the public health, stating all the time that they are proceeding cautiously and conservatively.

As an early constructive step, the public could insist upon the abolition of all "standard-setting" bodies. Major decisions concerning exposure of the public to poisons such as radioactivity or other poisonous technological by-products belong in the public forum. Such decisions, often dealing with effects upon the heredity of the human species, are what we choose to call decisions for all men for all time. A very broad representation of society as a whole must assume active participation in such decisions.

How could such a broad segment of society make sound decisions concerning exposure to a poison such as radioactivity? There are several prerequisites:

1. Abolition of "experts" or "standard-setters" as decision makers.
2. Honest presentations of the hazards of by-product poisons.
3. Honest presentations of the benefits of proposed technologies, including serious consideration of alternative methods of achieving the benefits.
4. Open-forum debate, followed by decision either by public vote or vote of public representatives.
5. Preservation of the option to reverse decisions. New information concerning hazards and benefits must always be anticipated. Society must preserve the option to change its choice of technologies in the light of new evidence.
6. Recognition of the principle that the appropriate permissible dose of a man-made poison is zero. Deviations from zero allowable pollution must be allowed only by public decision to be polluted in exchange for some benefit it chooses to receive.
7. Recognition that the burden of proof is upon the technology to prove safety, rather than for the public to prove hazard.

Clearly, the major inputs are (2) and (3), the honest presentations of hazards and benefits. It is to be expected that enthusiastic supporters of the technology will be abundant, simply because dollars are associated with the technology. These proponents will describe the benefits glowingly; they will discover the hazards to be minimal or zero. Further, they will find alternatives to their technology to be non-

existent or hopelessly difficult.

This all describes the nuclear electricity industry perfectly. It is what we can expect for just about any hazardous technology. And this can hardly be described as the kind of balanced presentation required for decision-making by the public or its representatives.

The obvious requirement is an assessment of benefits and hazards by competent scientists and engineers who do NOT derive their income and support from the technological entrepreneurs, private or governmental. What is needed, therefore, is an adversary system of technology evaluation. Such adversaries must provide the information the technological proponents might fail to provide. The public may be surprised to realize that this essential adversary evaluation of technology is totally absent in our society.

The heavy hand of economic and job reprisal is so well appreciated by scientists and engineers that few actually involved in the technology will speak out against it. We must create a reprisal-free system of adversary assessment. We must learn how to fund such a system so that it cannot be silenced by the entrepreneurs or their bedfellows in government.

Strangely enough, such an adversary system would cost very little. If it were mandatory that a few per cent of the dollars that go into a new technology go into the funding of technology assessment, the resultant development of sound criticism of technology should be phenomenal. This would give the public a chance for a reasonable, open-forum debate concerning vital new technological directions.

Of course, the sponsors of up and coming technologies will, at first, regard it as a thwart. However, with more sober consideration, they may very well become major supporters of adversary assessment early in the development of a new enterprise. Unpleasant facts about a technology have a way of becoming the most constructive approach in working towards solutions.

Today we have only a monologue, in the absence of adequately supported adversary technological assessment. The early establishment of reprisal-free, fully funded centres for adversary criticism of technology can correct this serious situation, to the advantage both of enterprise and society as a whole.

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Celtic Nationalism

by P. Berresford Ellis

Celtic nationalism is part of a world movement: a reaction to a growing world sickness. All over the globe there is a groping new individualism rising in revolt against the mass society of our day. The revolt is against the tremendous drive of "big power" politicians towards a world state, a world government and a world language and culture.

Unity through uniformity where there are no national barriers. This is the simplicists' way of achieving world peace and co-operation by an attempt to destroy natural differences between men (i.e. language and culture) . . . the achievement of the fallacious dream of a Brave New World.

Celtic nationalism, along with the struggle of other small nationalities to achieve cultural, political and economic freedom, is a reaction to this idea. In Europe we have Basques, Catalans, Galicians, Wends, Frisians, Flemings, Lapps etc, who are struggling to preserve their national identity. In North America the rise of the American Indian and Negro movements (which places a heavy accent on cultural environment) is another aspect of the revolt against uniformity.

Why are small linguistic-cultural communities important? It is often said that language is merely a means of communication. If it were true, then the development of the vast range of different languages spoken throughout the world would have been one of the great catastrophies of human history. Language, however, is more than a material means of communication.

Culture is that very distinct quality of living that is to the community what personality is to the individual. The main medium of mental cultivation, or culture, is language, and diversity of language is absolutely necessary for a rich diversity of culture.

As Martin Brennan writes:

"If this ever growing uniformity of the material side of our life is not offset by a rich cultural diversification, then man will face an awful crisis of a deadly sameness and monotony of life, a frightening prospect of utter boredom

of spirit which would deprive him not merely of the will to achieve but the very desire to survive."

The more the individual, the community and the nation feel that they have something particularly their own to contribute to mankind, the more they will respect themselves, and respect other people; the more they will be heartened to develop that unique set of values which they possess. It would seem that diversification of language and culture is the product of a very fundamental law of human nature.

Critics claim that languages are barriers but barriers need not be purely negative things; they can be creative. Barriers to reproduction between originally interbreeding sections of plant and animal species have been the means of enabling these to speciate and produce the present rich variety of living forms. At the cultural level the partial barrier of language enables different groups to develop, diversify and enrich their own inherited cultures instead of having their individuality finally washed out in a flat uniformity.

The language and culture of a people are that people's very basis for being. Language is a product of many centuries of cultural development, a vehicle of all the wisdom, poetry, legend and history which is bequeathed to a people by its forebears. Rough hewn, chiselled and polished with loving care it is handed down as a beauti-

ful work of art—the greatest art form in the world—the noblest monument of man's genius.

The repression of small languages and cultures is due not only to a cynical expansionist policy but also to a lack of understanding of the values enshrined in the languages of minority groups. It is generally believed that a language that does not possess a rich literature is a poor vehicle of expression. Eduard Sapir wrote: "The most primitive South African Bushman expresses himself with the help of a rich symbolic system which in essence is quite comparable to the language of a cultured Frenchman. . . . Many primitive languages have a richness of form, a wealth of possibilities of expression which surpasses anything known in languages of modern culture."

Language, thought and culture are inseparable. No idea can exist without linguistic expression. Language and thought are but two aspects of the same thing. To change one's language is tantamount to changing one's mentality.

As Benjamin Lee Whorf writes: "We are inclined to think of language simply as a technique of expression and not to realise that language first of all is a classification and arrangement of the stream of sensory experience which results in a certain world order, a certain segment of the world that is easily expressible by the type of symbolic means that language employs. In other

words, language does in a cruder but also in a broader and more volatile way the same thing that science does."

In the countries where languages and traditions have been suppressed or relegated to second class positions the members of the ethnic groups are correspondingly deprived and degraded. This is true, unfortunately, of Celtic society. The Celt finds himself in an environment where he is taught that his status as a Celt is of no importance.

He is taught that his status can only be improved by being assimilated into English or French society, that his culture is of no significance and that his only useful role in life is as the physical producer of material goods.

Is it any wonder that Celtic society produces a fantastically high percentage of alcoholics—one hospital in Brittany estimates that two-thirds of its admissions are alcoholic cases; that Celtic society produces the biggest percentage of prostitutes in the UK and in France; that Celtic society has the highest rate of social misfits? In short, the unhealthy Celtic society is a product of years of Celtic degradation and the imposition of alien cultures and ideals.

Fortunately the system of punishing children who spoke a Celtic language in schools has stopped (not in Brittany, however). In Welsh schools until the early years of this century great use was made of the "Welsh Not", a piece of wood hung round the neck of anyone heard speaking Welsh in school. It was passed from child to child during the course of the week and the boy who happened to be wearing it on Friday was flogged. One of the 1844 education Commissioners in Wales wrote: "My attention was attracted to a piece of wood, suspended by a string round a boy's neck, and on the wood were the words, 'Welsh stick'. This, I was told, was a stigma for speaking Welsh. But in fact his only alternative was to speak Welsh or say nothing. He did not understand English and there is no systematic exercise in interpretation". More "humane" teachers, such as Dr Phillips of Neuaddlwyd sent a monitor to collect pennies in fines from pupils overheard speaking Welsh.

The beatings in Scotland continued to more recent times. Dr J. L. Stewart now of Magoebaskloof, South Africa) wrote: "When I was a boy most of the teachers in Highland schools came from the Lowlands and were encouraged to discourage the Gaelic. I well

remember such a teacher named Todd from Hawick who gave boys the Tawse (leather strap) if he heard them speaking the vernacular". Miss Sarah Macphail recalls: "The children did not have the nerve to be heard speaking Gaelic when they were playing for they would be beaten for doing so. They had to tell on each other when they heard Gaelic being spoken. A girl in school who was heard using Gaelic and a school friend told the master and she was beaten for it". In one Scottish school an actual human skull was placed round the neck of the child who dared to express himself in his own language.

Traumatic Effects

It does not require a great deal of imagination to realise what sort of product would emerge from this "educational" establishment. One cannot wonder that the average Gaelic speaker today is diffident, clannish and slightly hostile to all strangers even to those strangers who by their willingness to learn Gaelic have shown they are in great sympathy with the future well being of the Gaelic speaking peoples.

To suffer the traumatic experience at the age of five of being pitched suddenly into an absolutely hostile environment where the only language they then knew was beaten out of them with a Naide Crochaid, hanging stick, has resulted in the terrible environmental sickness of the Gaelic speaker.

Today there are few cases of children being beaten for speaking the language but the traumatic experience is still the same. Tormod MacLeod recalled in 1965:

"As an infant of five, newly arrived in the classroom, I was confronted with a young lady, who seemed to me to be a goddess, but remote. We had no common language. I knew no English, but she spoke no Gaelic. Learning the Roman Alphabet might seem to be a task equal for all normal infants, but the task is made difficult for the child who receives instruction and explanation in a foreign language which he does not know."

The observer recently admitted: "Over many centuries and until quite recently, the English treated the Irish, the Scots and the Welsh much as the Germans treated their Slav neighbours—with a mixture of ruthlessness and mockery." The days of ruthlessness in eradicating Celtic nationality (i.e. lang-

uage and culture) seem to have gone in the UK but the mockery continues unabated and many of the "brain-washed" Celts have joined forces with their oppressors in sneering and ridiculing their heritage and those "provincials" who still cling to it.

Such a hostile environment to the Celt has produced a general inferiority complex. This inferiority that the Celt is made to feel reveals itself in the way many Celts who are native speaking of their respective languages will pretend to outsiders that they have no knowledge of the tongue and insist on speaking English or French, no matter how scanty their knowledge of these second languages. One aspect revealed itself to the author when a Scottish friend wrote to a school in the Gaelic speaking area of Scotland, to a school teacher who was a native Gaelic speaker. This friend therefore wrote in Gaelic. The reply from the native Gaelic speaker came back in English with even my Scottish friend's name Anglicised on the address!

Loss of Identity

The neutralisation of Celtic history has led to many anomalies in these islands. The average Breton will insist that the Breton language is a dialect of French! The Scot will insist that there are two nationalities in his country—the Highlander (who is a Celtic speaker) and the Lowlander—who is a Teuton, despite the fact that Gaelic was still spoken in Galloway and Ayrshire until the 18th century, and that Gaelic was spoken all over Scotland from the 11th to 13th centuries. There is the society "Monmouth is an *English* County" who insist the county was never a part of Wales! The average Cornishman thinks he is just as much English as a man from Kent... despite the fact that his language (whose last native speakers died in the latter half of the 19th century) gave the world the romance of Tristram and Iseult and the legends of King Arthur.

The Celtic societies are culturally sick. The cure is well known and has been successfully carried out in other countries... it consists in reviving their language and with it their literature, history and traditions and all the other half-forgotten aspects of their cultures. Only then, will they regain their true identity, and only then will they feel pride in their past and confidence in their future.

Factory Farming

A passing aberration

by Ruth Harrison

Ruth Harrison's book *Animal Machines* revealed the appalling cruelty of factory farming.

In this article, she points to the other shortcomings of this method of food production, by virtue of which she considers it is unlikely to constitute more than a passing aberration.

A characteristic of farming methods during the thousands of years when the human race was expanding at a controllable pace was that they were self-perpetuating—in broad principle what was taken out of the soil was, in one way or another, put back into it and the soil continued to produce.

The industrial revolution, however, brought in its train new modes of thought in which immediate material gain became paramount and this new attitude spread to farming, if more slowly than in other spheres. It was partly ignorance but also partly greed that resulted in the ravaging of virgin prairie soils by concentration on one crop agriculture. The industrial revolution also brought with it the chemist and the use of fertilisers and man began to tread the slippery downward road of taking more out of the soil than it could bear, making up the deficiency with the application of fertilisers. He is still treading this road and so far taking things by and large, he has managed to maintain and even increase production from the soil, and he will be able to continue doing this for many years to come. But not forever, and not at a

continually expanding pace.

"There is a running battle between pests and diseases on the one hand and scientists on the other" comments the recent report on soil fertility, and adds, "it is undeniable that specialisation in cropping has made it more difficult for scientists always to be on the winning side." Once man felt he could safely ignore the self-regenerating process which had been the feature of earlier farming practices he turned his attention to modifying livestock farming in the same way and a similar running battle has developed over the disease problem with livestock.

The factory farmer aims at a maximum turnover of capital with a minimum of effort and *through the introduction of a new system*. He makes use of all that technology has to offer him and his main criterion is immediate profitability. Psychiatrist Dr David Cooper has described these systems, in their most stringent forms, as "characterised by extreme restriction of freedom, enforced uniformity of experience, the submission of life processes to automatic controlling devices and inflexible time-scheduling . . . and running through all this the rigid and violent suppression of the natural."

Growth of factory farming

The individual farmer has been under increasing economic pressure; on his limited acreage he has had to increase the scale of his operations to meet rising costs. The trend towards permanently housed animals and increased stocking rates has been due to this individual need rather than to any overall national shortage of land. Whilst it is true that we lose some 50,000 acres of cultivated farmland a year to urbanisa-

tion and industry—and tragic that it is so often best quality farmland—it is out of a United Kingdom total of more than 30 million acres of cultivated farmland and many more million acres of rough grazing. If we were indeed so short of land that it became necessary to pack animals shoulder to shoulder in buildings we would have to switch to growing vegetable protein to feed direct to people, for although we save space by confining the animals in this way they still have to be fed. Further, we rely on imported feedingstuffs for them (as was brought home with some force during the recent dock strike) and some of this food comes from countries with a serious food shortage of their own.

Grassland is being used at only a fraction of its potential because there has been a tendency for agricultural support to favour the man who confines his animals in buildings. Agricultural economist J. R. Bellerby goes into this in some detail in the book *Factory Farming* recently distributed by the British Association. He points out that "about two-thirds of the agricultural gross rent is paid by those who graze their stock . . . meanwhile those who pay virtually no rent in rearing livestock are directly and indirectly subsidised to an extent which places them in the position of an 'infant industry'. In a period of up to 10 years, up to and including the year of the estimates for 1968/9, substantial sums, reaching a total of £800 million or more, have been assigned to subsidies of particular benefit to those who have reared animals indoors."

A third and important factor has been the development and promotion by high-powered salesmanship of buildings and equipment and electrical and mechanical appliances covering such things as lighting, ventilation and auto-

matic feeding, watering and slurry removal. There has been an enormous investment in research into new feed compounds and into genetic breeding towards increased productivity. There has also been competition from the pharmaceutical firms with insecticides, growth promoters, antibiotics and therapeutic drugs. There may have been a direct saving in labour on the farm but proliferation of jobs for the boys behind the scene has been almost endless. This research has undoubtedly led to increased productivity in agriculture from improvements in housing, breeding, feeding and labour-saving devices. It is relevant to ask whether it is not the results of the research which have led to increased productivity rather than permanent close confinement of animals in buildings? And whether, where the results have been applied to more traditional methods, they have proved just as efficient?

When one considers these factors, along with high-powered advertising, official advice and social pressures on farmers not to be "old-fashioned", it comes as something of a surprise to find that only a minority of farmers use extreme methods, and very often these are not farmers at all but business interests who have entered the farming industry. For example, although 86.8 per cent of laying hens are kept in battery cages they are in the hands of only 21 per cent of commercial egg producers. A minority of producers with very large holdings can thus cause suffering on a very large scale.

Factory farming. Emotive words? Maybe, but for an emotive situation.

Many millions of animals especially in western Europe and other highly developed countries now eke out their existence in dim buildings and so closely confined that they have difficulty even in grooming themselves.

Is it worthwhile? Are these "biological factories" producing healthy food? Are they feeding the hungry? Necessary because of increasing populations? Beneficial to the environment or even to agriculture itself?

Consumer health

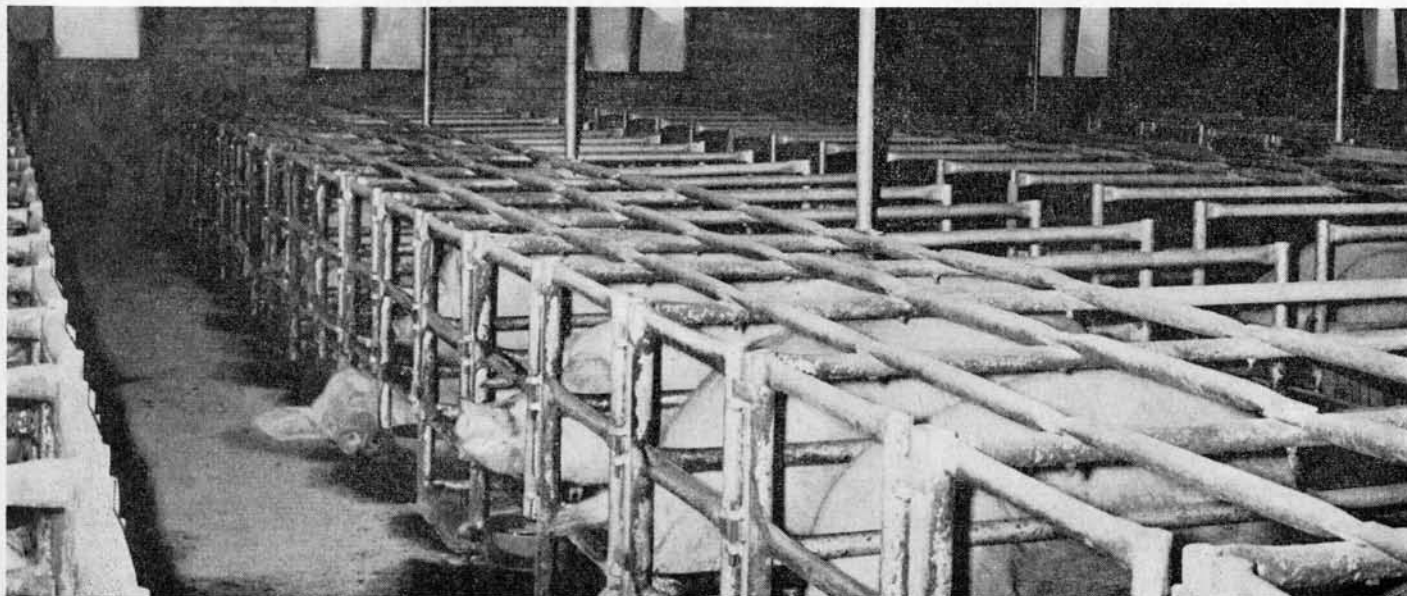
Although genetic breeding has resulted in birds and animals which convert food more efficiently, it has also resulted in less hardy animals with decreased resistance to disease. Permanent close confinement in buildings and heavy stocking rates also militate against health. It has been queried whether the circulatory system in an animal which has been denied exercise is able to respond adequately to the extra demands placed upon it by disease and, in spite of all the research into new vaccines and drugs, disease outbreaks in these buildings seem inevitably to reach epidemic proportions. One has only to mention Marek's, fowl pest, infectious bronchitis, diseases which cost the industry many millions of pounds a year.

Where animals are kept in hundreds or even thousands there can be very little individual attention and the practice has grown of adding antibiotics to feedingstuffs as a routine measure, not only as a prophylactic but also as a growth promoter. This has led over the years to resistance in organisms of the

gut to the antibiotic used. Further, this resistance can be passed from one bacterium to another and multiple resistance can develop against all known antibiotics. In certain circumstances this resistance has been passed on from animals to man. A large percentage of the ever-increasing reported incidents of food poisoning each year have been traced back to abattoirs, poultry packing stations and farms of origin. It is almost beyond belief that agriculture should have allowed the routine use of chloramphenicol, our only weapon against typhoid. The Swann Committee, set up to investigate the use of antibiotics in agriculture, recommended in its Report of 1969 the withdrawal of chloramphenicol except in rare cases of therapy, and also that no antibiotic be used as a feed additive if it is also used in either human or animal therapy. A first step, but one cannot help thinking rather wistfully that a ban on the routine use of any antibiotic in feedingstuffs would have resulted in an immediate improvement in management and a reversion to better systems.

It is impossible to mention all the additives used but two more deserve a brief word. Arsenical compounds are used as growth promoters in pig and poultry feeds and spot checks have revealed residues above approved levels. A public analyst recently did checks in four or five abattoirs and found arsenic in pigs' livers in varying amounts up to 30 ppm, whereas the regulation limit is 1 ppm. Stilboestral is still used to fatten "barley beef" steers although its use has been considered sufficiently hazardous for it to

These sows cannot turn round in their stalls. The pig is as intelligent as the dog. (photograph: British Farmer and Stockbreeder)



have been banned in every other European country.

Very little work has come to light on differences in nutritional quality of food produced under different systems. The little which has reveals why.

For example, tests on eggs have shown significantly less B₁₂ in battery eggs compared with strawyard eggs. the biochemists' report (to the Animal Defence Society for whom they carried out the tests) states: "The most dramatic difference is in the figures for vitamin B₁₂ (anti pernicious anaemia factor). This is serious especially for vegetarians." A comparison of meat from broiler chickens with that from free-range chickens, carried out by the Ministry of Agriculture, showed significant loss of thiamine in the broiler birds. In one regimen a third was lost, in another a half. Initial work has shown that there is only half as much iron in "white veal" as in veal from normally reared calves, a result to be expected since "white veal" calves are fed an iron-deficient milk substitute to keep their flesh pale.

Significant loss of individual factors alter the balance in food. It has been argued, wrongly I suspect, that this is of no importance to lavishly fed people. But a far more serious question is arising, that of a change of composition in some factors. Dr Michael Crawford and other nutritionists have found a change in the proportion of saturated to unsaturated fats in wild and domestically fed animals. Dr Hugh Sinclair has commented that this is still further accentuated as between grazing and stall-fed animals. Both scientists point to a change in farm systems as being the cause. Dr Crawford comments (*Lancet* 17.12.69): "As the high-saturated fat, low-quality product appears specific to the modern intensive systems and does not apply to any other animal system, it could not have applied to the food practices of recent history, let alone prehistory," and Dr Sinclair stated on a television programme: "...these bullocks are eating their natural food at the present time, namely grass. But during the winter they would be stall-fed and would produce more saturated fat on them. The same is true for pigs... the broiler chicken has largely saturated fat as compared with the free-ranging chicken, and the same is true of the battery egg as compared with eggs from a free-ranging hen. So that the more we feed animals on their

less natural foods the more we produce saturated fat in their bodies and therefore in our own bodies." Dr Sinclair believes that these abnormally large quantities of hard (saturated) fat are causing the epidemic of coronary disease in man.

It is tempting to make the cynical comment that people will get the food they deserve if they are not willing to pay a little more and make a little more fuss. But in fact this is not strictly true. For it is only by labelling that the public can make known its preferences, and labelling of food as to all chemical additives and methods of production has been rejected as being too complicated to enforce. The townsman has little chance of being really discriminating but the rash of shops selling "free range" and "farm fresh eggs" shows that he does try.

Amenities

It is not only man's health which is at stake. There is degeneration of the countryside to which he turns for refreshment and revitalisation.

Subject to certain provisos a farmer can build up to 5,000 sq. ft., without seeking planning permission. This he can continue to do at two-yearly intervals. Alternatively he can seek permission to develop, can appeal on a refusal and if the appeal is dismissed can claim compensation. Planning authorities are becoming increasingly wary of granting unqualified permission, but in many areas the damage is already done and sites are covered with row upon long row of buildings, sometimes with silo type food hoppers at the head of each, indistinguishable from a monotonously designed factory or munitions dump. Most amenity societies have confined their concern to this visual spoliation of the countryside but there are other important issues.

Nuisance

There is nothing to stop farmers building adjacent to residential property and in these cases nuisance from mice, rats and flies is almost inevitable and most difficult to overcome. Battery houses form an ideal breeding ground for flies. The birds, which would otherwise deal with the problem themselves, are prevented from doing so and flies breed in comparative peace. So we create a health hazard, since flies carry disease from dung to human food,

which can only be kept in check by the highest standards of management. Too often lethal doses of insecticide are used to cover up management inefficiency, insecticide which finds its way eventually on to the land or into our water supplies.

These food factories create other nuisance. An unremitting noise twenty-four hours a day from the automated equipment; an unremitting smell from the enormous output of effluent.

Effluent

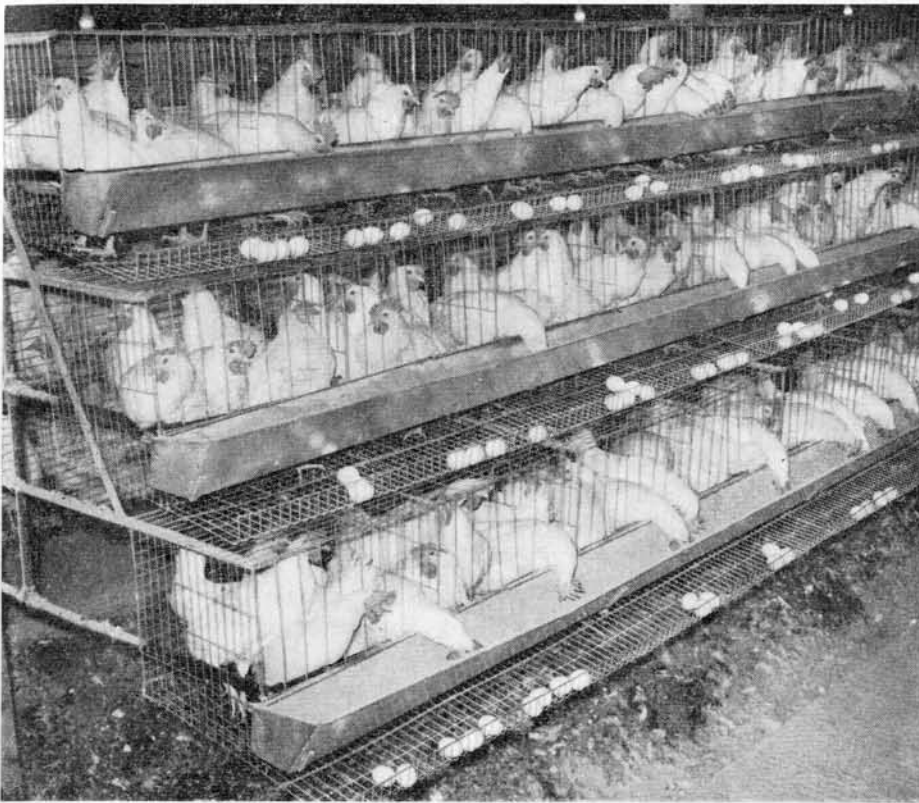
I said earlier that the soil used to be self-regenerating. One of the reasons for this was the ploughing back of animal droppings, a principle source of fertiliser. It is one of the biggest indictments against factory farming methods that this erstwhile beneficial process has been turned into a mammoth problem.

Often animals and birds are kept on slatted or wire floors and droppings are collected into slurry tanks below them. There is a very real danger of a build-up of noxious gases, which, if ventilation is inadequate, can cause mortality to both livestock and their human attendants. Added to this, where slurry is sprayed on to the fields after storage in tanks it can create nuisance by smell, especially in hot weather.

At one time it was possible to discharge effluent into rivers and waterways, but in 1961 this became an offence and permission had to be sought from Water Boards. Strong effluent discharged direct into waterways causes loss of oxygen, death of insects and fish, plant flora are drastically affected and finally the watercourse becomes putrid.

Manure is sometimes discharged into public sewers. When one considers that a sewage disposal unit for 24,000 hens is equal to that for 4,000 people not only the size of the problem but the absurdity of the wastage is apparent. Where the facility is available farmers may now be charged for it, and the charge can be prohibitive.

Over the last few years methods of drying effluent have been developed to make it into an odourless fertiliser. But this process has run into problems and much suffering has been caused in the vicinity from the smell. Factories of this nature have had to be closed by local authorities receiving too many complaints. There has been talk of



Battery cages. In 1969, 86.8% of our eggs were produced from battery houses. Birds are often housed three to a cage.

A broiler house. These birds are kept in dim light and have less than $\frac{1}{2}$ sq. ft. of space each. Antibiotics are added to their diet to prevent disease.



dumping effluent out to sea.

Social costing

How often have we been assured that we *can* have cleaner air, less noise, better quality food, better landscaping and so on and so on, but that it will cost a little more? This is largely costing which can be fairly accurately measured. But it is very rarely pointed out that against this there is the social costing which is less easily measured but every bit as important. Have it now pay later, is one of the slogans of modern society and this, in many ways, is what conservation is all about.

How does one cost the joy of a beautiful and varied landscape, the pleasure of seeing animals in the fields? How does one cost relief from flies, rats, noise, smell and distress caused to so many people living alongside these units? It is easier, but by no means easy, to assess the benefits of healthy food, healthy soil and healthy attitudes in relation to the amount we have to pay to rectify the results of poor food and unhealthy soil, but these are long term factors and it is always easier for governments to meet crises as and when they arise and to make piecemeal regulations to deal with them.

To sum up. Some of our present farming systems, known as factory farming, are ethically unacceptable to a large sector of the community, are producing less balanced, less nutritious food with possible hazards from additives used. The methods are contributing to nuisance in the countryside, to loss of fertility and to loss of amenity. Further, they do not contribute one iota to feeding the world's hungry. On balance they may do the reverse by absorbing a disproportionate amount of available resources on luxury food appropriate primarily to over-fed, highly developed countries.

Piecemeal measures which have been taken so far have only made the situation worse by a refusal to face the real issues involved. For example, chickens have been too closely confined indoors. This has led to disease, counteracted not by less close confinement but by mass medication. It has led to "vice" which again has not been counteracted by a change in the system but by cutting back the beak to prevent damage or by keeping the birds in darkness so that they cannot see to peck.

So we fall from one crisis to the next because we are afraid of admitting

that we may have overdone things in the first place and of taking any really positive steps.

But there is nothing absolute, nothing inexorable about the situation. The impetus of extreme methods has been strengthened by artificial causes rather than by natural needs. If we feel that they are not in our long term interest they can still be changed; we do have a choice.

It saddens me when otherwise humane people condone suffering in animals on the grounds that it is necessary because increasing human populations have to be fed, without querying the morality of ever-increasing human populations. Will not the degrading of every other form of life lead to man's own degradation?

It is profitless to fool ourselves that we can exist without exploitation but it is part of our ethics to differentiate between what is essential and what is avoidable, and where do we draw the line? Most farmers, as I have shown, draw the line far short of immobilisation of their stock, and commercial interests are increasingly putting effort into improvement of more traditional systems. I would like to see far more

urgent research into this form of improvement for herein lies the only real progress. We need systems which do not deprive the animal of the exercise of inherited behaviour patterns, that do not deprive the soil of organic manuring without which long term fertility is lost, systems which maintain the precious amenity value of a rich and varied landscape.

It would be unfair to ask the farmer to provide all this at his own expense. We must as a community decide which systems are biologically and ethically acceptable and then as a community make sure that the farmer is adequately recompensed for using these systems on our behalf. I have shown that it has been of short term financial advantage to the farmer to take his stock off the land and confine them in buildings. The long term advantage is not proved. The social disadvantages, in my opinion, are proved and we can reverse the financial situation so easily and immediately by re-channelling funds from factory farming to the improvement and use of grassland for grazing stock. In making this simple administrative change we shall, at the

same time, contribute to the amenity value of a varied and pleasant landscape with animals once more to be seen in the fields.

Our ultimate survival depends on our ability to live in harmony with our environment, to work with nature rather than in spite of it. Because food production increases steadily in pace with population increase it may be thought that it can go on increasing indefinitely. A little thought will show that this is not so. The land we have available on our globe is of finite extent and this earth of ours will produce only an optimum amount of food to support a finite population. The optimum balance will, furthermore, only be maintained in conditions in which constant regeneration, the availability of nutrients for the soil, of water and so on, is possible. Though it is outside the scope of this article, it can be said that farming the sea as an adjunct to the land has equally finite limits—there are no other continuing sources of food for homo sapiens.

Note: appeared in *Can Britain Survive* edited by Edward Goldsmith, published by Tom Stacey & Co. £3.

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Karl Marx and Friedrich Engels developed their social theories in an age that had as yet little cause to question the general belief in man's limitless material progress. Thus, it is not surprising to find that, in many ways, these theories are irreconcilable with present day ecological thinking.

Yet there may be more for us to learn from these remarkable men than we think, especially as towards the end of their life they developed some notion of the physical limitations of Spaceship Earth.

Marx and Ecology

by G. N. Syer

Doomsday theories of man's self-destruction are, the Institute for Ideological Change pronounced, an open call for Fascism. Somewhat innocently we thought that this ought to be challenged. What, we asked the chairman, a remarkably pretty girl, about the dangers of a doubled world population by the end of the century? Talk of the population explosion, she explained, is a deliberate attempt to divert attention from the revolutionary struggle. What then is the level of population that the world can stand so that everyone can have a reasonable standard of living? Any attempt to limit population is a vile slander on the working class and a wicked bid to distract attention from the sacred struggle of the revolutionary masses. Pollution then—what about the perils of, say, the increasing amount of CO₂ in the atmosphere? An isolated fact, perpetrated to cover up the failings of the capitalist system and a criminal attempt to . . . and so on.

Student Marxism is not the subtlest kind and must be similar to that which drove the exasperated Marx once to declare that he himself was not a Marxist. Yet beneath the slogans and the abuse (on this occasion we were relieved to find that we were merely academics and Philistines and not, as we feared, Fascist hyenas) there lies a genuine and long-standing ideological difference between Marxism and theories of population, notably that of Malthus.

Marx himself does not seem to have dealt extensively with the basic proposition of Malthus that, since population increases at a geometrical ratio unless checked and food production only in an arithmetical ratio, population will always press against the means of subsistence. As he often does when dealing with his opponents Marx relies on abuse "the contemptible Malthus" and a "vile libel on the human race", thus establishing a tradition which is well upheld by some of his modern followers. Engels, although indulging in some abuse himself, recognised the importance of Malthus by discussing his theories at length in his "Critique of Political Economy" of 1844. His objections and those of later Marxists seem to be two.

The first is one of philosophical theory. Marx's philosophy is dialectical materialism, the dialectics of which he derived from Hegel and the materialism from Feuerbach. This underlies the working of the universe. Thus any other explanation, such as that by

Malthus, of the relationship between man and nature is precluded.

The second objection is that Malthus and other classical economists used the theory, or so the Marxists alleged, as a justification for *laissez-faire* economics and for ignoring the sufferings of the working-class. A normally benevolent man, convinced of the validity of Malthus' theory would have to regard the failure by some members of the working-class to obtain the means of subsistence as the inevitable consequence of a natural law. There would be no possibility of betterment of conditions for all the working-class if that class always bred so that their numbers passed the means of subsistence. To this point of view Marx and Engels objected most strongly. "This vile and infamous theory, this blasphemy against nature and mankind", wrote Engels in his "Critique of Political Economy". If people are starving it is not because there are too many people, but because, arising out of capitalist competition, the economic system is not rationally organised in everyone's interest. Economists, sticking to their theories of competition, can only reconcile the presence of scarcity among potential abundance by employing theories of over-population. The productivity of the land can be increased *ad infinitum* by the application of labour, capital and scientific knowledge.

If we substitute "very much more" for the rash *ad infinitum*, then Engels in the conditions prevailing in the mid-



Karl Marx



Friedrich Engels

nineteenth century was right, for the validity of Malthus depends on there being progressively less food as the pressure on the land gets greater. But at the time there were huge areas of land, particularly in the New World, which had yet to be brought into cultivation. The increase in scientific knowledge about the breeding of new varieties of food plants and animals and the improvement of agricultural methods justified Engels' optimism.

Embryonic ecological awareness

Later in his life Engels acknowledged that population could not grow indefinitely, for he writes in a letter of 1881 (see Anthony Flew's Pelican edition of Malthus) that there is an abstract possibility that the number of people will become so great that limits will have to be set. If so, then only a communist society will be able to set such limits. And in his "Dialectics of Nature" he recognises the interdependence of living things. The people of the Mediterranean and of Mesopotamia, he writes, who destroyed forests to obtain cultivable land did not realise that by so doing they would be rendering their lands waterless. Each conquest of nature takes its revenge on us. Unforeseen consequences of our actions sometimes cancel out the con-

sequences we expect. Thus we by no means rule over nature like a conqueror, but we are part of it and exist in its midst. Our mastery, he concludes, consists only in the fact that we have advantages over other creatures in that we can know and correctly apply nature's laws.

In most respects the prophecies of Marx and Engels have fared badly. The proletarian revolution has not come about in any major industrial country; where it has occurred, in Russia in 1917 and in China in 1949, it has done so in what were then predominantly agricultural countries, thus defying Marx. Nor has the gap in living standards between the bourgeoisie and the proletariat in advanced countries inevitably widened; on the contrary it has nearly everywhere narrowed. There is, though, one area where this prophecy seems to be coming true and that is in the relationship between the industrialised countries and the underdeveloped ones. Here the disparity in wealth seems to be increasing, ironically on account of the increase in populations. Marx did not foresee, either, the growth of middle-class technocracy arising from the technological advances of the last fifty or so years. The boom and slump cycles, which Marx predicted and on which

Capitalism was to founder, seem to have been averted as a result of the application of Keynesian economic theories.

Judged, then, on its predictions, Marxism lacks credibility. Despite its claims, it is not scientific, for it is based on the study of a pathetically small sample. To employ its own criterion (that ideas, philosophies, art-forms and beliefs are but the reflections of the prevailing economic structure) then it is a body of belief arising from, and reflecting, an expanding confident nineteenth century which was getting richer and richer and which could not see any end to the material gains that industrialism would bring. Marx's belief that "history" moves ever onward and upward until, after the inevitable revolution and period of dictatorship, it ends in a classless society of plenty for all, is part of the same cosmic optimism. Such a belief is within the Judaeo-Christian tradition (Bertrand Russell offers a list of Marxist equivalents to Christian institutions) and bears strong similarities to Cargo and other millenarian cults.

The cost of progress

Marx's optimism was possible because he was unaware, as we all have been until recently, of the strains

material progress was to put on the planet and of the consequent pollution and depletion of resources, those results of human arrogance which now are causing us so much concern. It is true that there was considerable pollution in Marx's day, as we can discover from the pages of such writers as Dickens, Mrs Gaskell and of Marx himself, but it was largely restricted to industrial areas and was capable of absorption by nature. That it could become so extensive and of such a kind as to threaten the basis of life on earth would have been incredible to him, as incredible as it now seems to be to some of his followers. A century later we can understand how, to use Marxist terminology, in the pollution of life-support systems a quantitative change can become a qualitative change; how, that is to say, an eco-system can be changed irreversibly if enough pollutant is allowed into it. Essentially a townsman and despising what he called "rural idiocy", Marx, unlike Engels, seemed to be quite unaware of the fragility of much of nature, such as the soil, and of the possibility that the resources of the earth might one day be exhausted in the unlimited technological advance he thought to lie in the future. Scientific knowledge in Marxism is too often seen only as facilitating a desirable human activity, very rarely, if ever, as setting limits to it. This attitude is very common today and is not restricted to Marxists.

When the conservation—ecological—environmental movement (when, by the way, are we going to agree on a name for it?) works out its theoretical and philosophical basis, it will find much value in Marxism despite its manifest weaknesses. Although not based on any kind of practical reality—nothing is said about the matching of resources to the limited desires of people, for example—Marx's vision of a stable and harmonious society where

there is a reconciliation between men and men and between men and nature is not an ignoble one. Such a society is one for which we should be working, while rejecting any notion that it will come about inevitably through the workings of dialectical materialism.

The dialectic, too, while not perhaps a complete explanation of the working of nature can usefully be employed in some situations as a working hypothesis. Thus man's modifications of his surroundings which produce, as in pollution, something often neither intended nor foreseen but a third and new situation differing from the original activity and from the natural world, can be regarded as thesis, antithesis and synthesis. If we look at man's activities in this way, we shall avoid the dangerous dualism inherent in the common idea that man is separate from nature and can impose his will in any way he likes on a passive and unresisting world. It is true that both Marx and Engels usually wrote in this strain, as if men were still living as besieged frontiersmen, but, as we have seen, Engels, towards the end of his life, recognised the fundamental interlocking of man and nature. Marx, too, though less perceptive than Engels in this matter, looked forward to a less anthropocentric world-view. "Natural Science", he wrote in 1844, "will one day incorporate the science of man, just as the science of man will incorporate natural science; there will be a *single science*." (See Bottomore and Rubel's Pelican edition of Marx.)

Marx's materialism should also be considered. The word now, of course, has two meanings. The accumulation of wealth and possessions, the sense in which our churchmen and other moral leaders use the word, Marx seems to have despised. The other more philosophical meaning, that matter has primacy over ideas and mental processes, neither of which therefore are

self-subsistent but are only reflections of matter, we can profitably respect, at least in the limited sense that, for life, a human being needs a certain amount of food, of oxygen, of space, and of solitude and can withstand only a certain amount of pollution. These materialist facts must, therefore, in future dominate all our political and industrial thinking. Most of our politicians with their rhetoric and our economists with their impossible dream-worlds could do with a salutary dose of this kind of materialism.

The moral and egalitarian passion which moved the early Marxists should move us too. Conservationists are accused of being mere preservers of the *status quo*, concerned only with maintaining their middle-class privileges. This is a damaging criticism and one that seems to be growing. In the present environmental crisis, the most severe, as someone has said, in recorded history, it is all men who must be considered. And since most of our environmental troubles have come from the greed inseparable from capitalism then the revolution in thought needed for survival must come from the left rather than the right. One of the arguments for continual economic growth is that this is the only way that the underprivileged can have their standard of living raised. This is a specious argument and perhaps covers up a desire in the favoured to increase their wealth with a good conscience. The alternative to this is a more equitable share-out of what wealth there already is, not the dangerous obsession with infinite growth.

Marx's analysis is not, in the opinion of most of the competent critics, finally acceptable as a complete explanation of the nature of society and the world, yet it has much in it of very great value. Those who have tried to bring it more in line with twentieth century experience (the despised revisionists) like Marcuse deserve a careful study. Even our friends of the Institute do not talk nonsense all the time. So much for the theory of Marxism. But the theory of Marxism is one thing; the practice of it in Russia and China quite another.

THE SURVIVAL OF THE ENGLISH COUNTRYSIDE

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ERRATUM

The Ecologist, September, 1971, p. 33, Reference 3. "The British Journal of Sociology" should be "The British Journal of Psychology".

Reports

New hotels . . . with reservations

According to the British Travel Association, 25,000 to 30,000 more hotel beds will be needed by 1975. To meet these requirements, it would take about 40 hotels the size of the Hilton, the majority of them in Central London. A large part of the money for future hotel development will come from America where backers take a dim view of projects with less than 500 beds. The Hilton has 508.

But perhaps the American concept of what is economic for London hotels ought to be re-examined. Carried to its logical conclusion, remaking London the American way would eventually destroy a great deal of the tourists' reasons for coming here.

If a single Hilton surrounded by a reasonably Londonlike London is attractive to tourists, it doesn't follow that a city full of like structures will be proportionately more attractive. What is good for Milwaukee is not auto-

matically good for Mayfair.

Plans like the one for a 539 bed hotel at Hyde Park Corner, which would dwarf historic Apsley House and require the demolition of six buildings statutorily of historic and architectural interest, are products of this kind of thinking.

The owners of the new Berkeley Hotel in Knightsbridge, due to open in the Autumn of 1971, on the other hand, believe that the conservation of London's architectural character is good business. The building is eight stories high, and on the sides which overlook Wilton Place and a church it is faced in honey-coloured Clipsham stone from Rutland and roofed with Westmorland slate. The style is traditional, its object not to obtrude. In the Belgravia manner, it has a generous number of cast iron balconies in four different designs done specially by its architect, Brian O'Rorke. Inside, every bedroom is separately designed and the new writing room has been constructed to fit the venerable panelling and wood carvings done by Sir Edwin Lutyens for the old Berkeley writing rooms and carefully preserved.

Savoy Hotels Ltd., is convinced that standards of aesthetics and service are

inevitably sacrificed when hotels exceed a certain size. The attitude of their chairman, Mr Hugh Wontner, is essentially the long-range one of the conservationist. Even in Clapham where Savoy is building a hostel for trainees, Mr Wontner has insisted upon a style in keeping with that of its neighbours.

Apart from the obvious advantage of maintaining the character of the city, the Berkeley-sized hotel will also go a long way to prevent the enormous localised traffic loads which result from large hotels.

In areas like Camden and Kensington and Chelsea, the addition of heavy concentrations of transients would tend to destroy their residential nature. Shops and services would proliferate and traffic tie-ups and noise would complete the job.

Central London could be turned into a vast commercial sector with little other than hotels and businesses surrounded by an ever-growing suburb to which its former residents will have fled.

On this issue, as with so many others, the short-term view has taken precedence over the long. Even American financiers might be persuaded to consider the price.

Jean Liedloff



Reports

Natural Farming

There is no such thing as "natural" farming, as those of us who dare to challenge industrial farming are frequently reminded.

It is true, of course. As soon as an area of land is cleared of the plants nature has grown there and the ecosystem is simplified by the planting of one species, a whole world of balance is disturbed. Doubtless nature is outraged. Certainly the controls that operate to maintain the natural balance will come into play. There will be weeds, pests and diseases.

The aim of most modern farming is to defeat these controls and to maintain a superiority by force. Farmers nowadays have a fearsome armoury of machines and chemicals, backed up by battalions of scientists, to help them. Even so, there are good grounds for believing that in this kind of battle the farmer will lose in the long run. The weeds, the pests and the diseases have not been eliminated and the soil itself is feeling the strain.

The alternative is to minimise the extent to which the natural system is disturbed, to some extent at least to work with, rather than against nature. It is not "natural", of course, but at least it respects nature and attempts no brave, foolish, frontal attacks. It is the basis of traditional British farming for several centuries and the outlook behind it is still the outlook of many of our best farmers and of our organic farmers most of all.

What if it were carried further? What if a farmer were to attempt to reconstruct something that resembled a natural ecosystem and to live off the surplus it produced? The orthodox answer is that he would bankrupt himself, for even supposing he could establish such a system, the surplus is insufficient to provide him with a living.

Well, one farmer at least has done it and lives to tell the tale. Arthur Hollins farms 150 acres in Shropshire. His is a dairy farm and produces no crops that are not needed for the cattle. Mr Hollins uses no artificial fertilisers, and no compost either, yet

the fertility of his soils increases year by year. He reasons that nature needs no fertilisers so why should he, so long as he is able to discover how the natural system works? He uses no pesticides, yet he has no pest or weed problems.

Nor does the farm use much labour. Most of his work force—in fact, it is large—works in the factory that processes the milk and in the office. A staggering range of "Fordhall" products—butter, clotted cream (which he exports to Devon), soft cheeses, smetana, yoghourts, "yogices", "yogtails", fruit salads and vegetable salads (all with yoghourt) sells in expensive stores all over the country. The Fordhall reputation is based on the quality of its products and Mr Hollins is far from bankrupt.

These days the farm imports milk. It is very doubtful whether any 150 acre farm could produce anything like the quantities it uses. At one cow per acre the Fordhall stocking rate is rather low, and the mixed commercial herd yields an average of only 600 gallons of milk per cow per year but at 5 per cent the butterfat content is above the national average for pedigree Channel Island herds.

The most important thing to a dairy farmer is the quality of his pasture. It is on this that the health and performance of his animals depends and Arthur Hollins has devoted a great deal of his life to studying grasses. He grows leys and permanent pasture with the care another farmer might bestow on a valuable arable crop.

When he inherited the farm from his father it was badly run down and for several years he was never far from bankruptcy. Then he began to return to the land the muck from a pig enterprise and, later, the spent compost from the mushrooms that had given him his first taste of success. The texture of his soils began to improve and so did his yields. He was not convinced, though, that the compost was wholly responsible. He came to realise that the mixture of plants itself contributed. Each encourages its own population of soil micro-organisms associated with its own subtly different nutrient requirements. Deep-rooting plants may bring up nutrients from depths of several feet. When the plant dies these nutrients are returned to the top soil. So, he reasoned, if the right balance of plants can be struck they will supply

to the top soil all that is needed to establish and maintain a balanced, fertile, situation. He illustrates this by showing visitors two adjacent fields, each of which has received identical treatment for a number of years. One is gaining in fertility, the other declining. The only difference between them is that the more fertile one has 27 species of grass growing in it, the other, two.

He is opposed to ploughing. He found that when he ploughed a field that had not been cultivated for a long time there was a drop in fertility. This, too, he can explain. The life of the soil—the plants, the micropopulation and the organic matter on which it lives—is concentrated in the top four inches or so. If the land is ploughed to a depth of nine inches, this layer is buried and relatively sterile sub-soil is brought to the surface. He does not plough, and even rotavating, which chops and mixes the top soil, he regards as an unhappy compromise: it still cuts too deep. The ideal tool would be one that sliced away the top inch or two, leaving a firm bed containing the roots of many of the weeds to rot down and so open channels down into the soil, aerating and draining it, while the sliced off layer would be passed back into rotating blades that chopped, mixed and aerated it and threw it out behind to lie on the surface as a seed bed. In fact, he has designed and patented such a machine. The result would be to stimulate the breakdown of organic matter. There would be a "compost heap" in the soil itself. As it fermented it would raise the soil temperature a little and this would speed germination.

All living processes are subject to a cycle of germination, growth, maturity, death and decay. Most farming concentrates on stimulating the growth and maturity phase, but Mr. Hollins has chosen to accelerate the death and decay phase by allowing weeds to grow—one reason he has no weed problem is that he regards all the plants that grow as part of his crop—and then cutting and chopping them to speed up the release of the nutrients they contain. His approach is at least as reasonable as the more orthodox one.

He felt, too, that cows had evolved to live out of doors all the year round. For one winter he left half the herd out and now all his animals spend the whole year out of doors—he has no sheds to house them. They seem to

Reports

prefer it and while there are covered areas for calving he is just as happy for his cows to calve in the fields. They eat the food that is available, season by season, and this, too, he regards as important, for it is the food they have evolved to eat. He does make silage for use in particularly severe weather, but he refuses to cut a grass crop for silage until every species in it is in full flower. He will not give his animals a feed produced from plants that are not ripe.

His farming system is the creation of many years of thought and experiment, but the farm has always been commercial and has had to pay its way. Yet what he is developing seems to be an approximation of a natural system. The seed mixtures he sows are extremely complex and still he is prepared to admit that he may not have hit on the right mixture and that it may have to be changed. His rotation is based on silage and grazing, but within the pastures themselves each

plant dominates in turn.

His organic, ecological approach to life—for his farming is his life—extends to his relationship to his staff. He wanted to explain to them what he is doing, to arouse their enthusiasm. He began with a profit-sharing scheme which gave them an immediate financial interest in the business. Then he opened his garden to them. It is a large, well-kept garden, with a swimming pool, which they also use. A committee was formed. He and his wife are members of the committee, but they hold no office on it. It is the committee that decides on policy and if Mr Hollins has an idea it must be accepted by the staff before it can be implemented. With some successful businessmen this could be no more than a cover for paternalism, but in Mr Hollins' case he means it. He is a small, wiry man, with boundless energy and tremendous, infectious enthusiasms. While I was talking to him he became very excited about a scheme that would benefit the Soil Association, of which he is a longstanding and dedicated member. At the height of his planning—at times it went too fast for me to follow—he said he was sure he

could get the staff to join in; he would explain to them what it was about and how it would help everyone. They would want to take part.

He describes his life as "a meeting place, courtship and marriage of a man to his environment, his soil, plants, animals, weather and finally his products and his customers". Like many farmers, he feels a personal relationship to those who eat the food he produces. At one time they ran a country club at Fordhall and although that was closed years ago, visitors arrive by the coachload—between 4,000 and 5,000 a year—to be shown the farm and to taste the products. Mrs Hollins plans to open a guest house nearby.

He fears for the future of farming in this country. "The gap between chemical knowledge and nature's organic laws must be bridged in this generation or it will be too late," he said. He is right. Farming has to change; extremes of monocultural cereal growing and intensive livestock rearing must be modified, not out of nostalgia for a better past, but from necessity, because they do not work. The search is on for a new, higher standard of husbandry. The likelihood is that it will

Dr. Paul Ehrlich

Dr. Ehrlich, population biologist and ecologist, was recently in Britain for the publication of his new book

How To Be A Survivor

This book reminds us that, if man abdicates his responsibility to preserve his species on earth, then he will so erode, overtax and exploit his only habitat that he will destroy himself.

The destructive potential of the course that mankind is taking is no longer a matter of debate. In the 1970's decisive action is demanded. Whilst

and if we still have time to stem this tide of destruction the only answer is to plan a change of course. To effect such a change requires recognition and awareness of the problem. Dr. Ehrlich's perceptive analysis of the situation in this book clearly and simply defines the means whereby we can carry out this plan to become Survivors.



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Reports

aim to follow natural cycles more closely, that it will try to increase the diversity of species in each field and that it will rely on this diversity to achieve and maintain the balance it needs.

There is no such thing as "natural" farming, but some kinds of farming are more natural than others. Arthur Hollins' is probably the most natural of all. Keele University may undertake a research project to study his methods and their effects. It may well be that he has a great deal to say to farmers and to us all—for we all depend on their ability to continue indefinitely to produce food of high quality—and that is what it is all about.

Michael Allaby

SO₂ Chateau bottled?

The flames of the vent gases—those standard symbols of petrochemical progress—that flicker over the new Shell-Berre refinery at Pauillac, have sent smouldering a controversy that may spread well beyond the valley of the Gironde.

It is not that the refinery is unwelcome. Local opposition did not begin until the early summer months but, even then, everyone was careful to make that much clear. M. Pierre Perromat, for instance, who is president of the South West Regional Committee of the INAO (Institut National des Appellations d'Origine) issued a statement drawing public attention to the danger of the new installations but adding that, personally, he had no doubt the province had great need of new industries. "Could it be," he concluded gently, "that the building of a petrochemical complex might just as well take place elsewhere than in Pauillac?"

Why not in Pauillac? At mid point on the oil pipeline that runs the length of the Gironde Estuary, linking Bordeaux to the deep water terminal of Verdon, there has been an oil depot since 1923. The first refinery properly speaking was built in the thirties and did not survive the war. It was designed for a throughput of about half a million tons annually and when the refinery was built, after the liberation of France, it remained a rather small scale unit.

The new plant, however, has been planned to handle eight or nine times the quantity of oil and it was probably the scale of the new enterprise that first began to worry the locals.

For oil is not very high on anyone's list of fluid priorities on the banks of the Gironde. Pauillac, in fact, lies in the heart of the Haut-Médoc region. Together with Margaux, it covers some of the greatest of the red wine vineyards of France—the three famous appellations of Saint-Estèphe, Saint-Julien and Pauillac itself and encloses no fewer than 6,500 acres of vines.

A large scale map of this area reads like a wine list... of a rather exclusive sort. These are the fields that produce the august vintages of Latour and Mouton-Rothschild, Lafon-Rochet and Cos d'Estournel as well as a dozen or so slightly less exalted but still, by ordinary standards, splendid wines. On these hillsides, the vines are held in such esteem that even the road repair gangs do not venture to re-surface tarmac when "*La vigne est en fleurs*".

Even so, with oil on their doorsteps, as it were, for half a century, one would have thought that the local *viticulteurs* would have managed to keep their secondary fermentation under control. The upper echelons of management at the Shell refinery—in a bid to keep too many corks from popping—have lost no opportunity of pointing out the great advances that have been made in the handling of petroleum products in recent years. They have devoted a large slice of their public relations budget to emphasizing the strict controls against accidental pollution that are built into modern refineries.

In fact, according to some sources, the company was only persuaded to go ahead with its plans for the Pauillac refinery by the insistence of the lobbying from local authority interests. According to a statement made by the refinery manager quoted in *Le Monde*, Shell had seriously considered closing down the Pauillac plant in 1960. But the wine growers, unlike the local politicians, were never enthusiastic about the new installation and, despite the assurances they were given, they remained sceptical about the harmless nature of the treatment plant. Then came the Château-Latour incident.

Last September, while the *vendange* was in full swing, acrid smoke from the municipal refuse tip of Pauillac was suspected of having tainted a large part

of the Latour crop. The suspect grapes were isolated as a precaution and the wine was later tested. It was found that some 50 *tonneaux*—each containing nearly 250 gallons of wine—had been polluted by the smoke and the wine was pronounced unfit for sale. But that was not the end of the story, as far as Shell was concerned. The damaging element in the smoke, it was maintained, had originated in refinery waste that had been incinerated with the ordinary town refuse.

The damages for the spoilt wine have been calculated at 2 million francs, about £150,000, and a claim has been lodged with the municipal authorities for that amount. But the incident, with the suspicion that it entails that smoke polluted with refinery hydrocarbons can ruin the winemaking properties of a whole grape crop, has united the wine producers of the Haut-Médoc against the refinery at Pauillac.

An Association for the Safeguard of the Great Vineyards has been founded. Its aims include persuading the French Government to agree that "any extension of the petrochemical industry in the Haut-Médoc region should be strictly forbidden". As a longer-term measure, the Association plans the formation of a mixed commission—its members composed of experts in toxicology, viticulture, oenology and pollution—to safeguard the future of all of the great vineyards of France

G. Kingham

Poem

Dedicated to the Ecologist

THE STREET

Nebuchadnezzar built a marvellous street
the like of which no one had ever seen.
It was not simply the minimum space
between
the buildings, the cheapest number of
feet,
but it was wide and infinitely straight.

On Holy Days when Marduk reigned in
state
And the priests processioned with lesser
gods to his throne,
a throng of four thousand voices was
raised in praise.
And golden Marduk listened, seated alone.

Did he wink as he saw the Euphrates
changing its bed
while his priests read the stars? The
omens
of ruin are not in the heavens: the land
under the street is crumbling into the
sand.

Robert Waller

Down to Earth



by Lawrence D. Hills

Go as you grow

We are a greedy people and our Trades Unions, our Advertisers and our Politicians are shocked by any threatened reduction in the rate of increase of our gluttony. Like seagulls round the whale carcasses once hauled up the slipways in South Georgia, we scream and fight and eat till we can hardly stand, gorging on petrol, oil, coal and nuclear fuel as though it would last for ever. The dwindling of the whaling fleet has ended the long orgy of the seagulls and crashed their population back to the level it was before the brief bonanza that began with Moby Dick and ended with the Japanese factory ships.

Our bonanza of fossil fuel will have lasted about three hundred years from when coal began to be used industrially in the 1750s to the decades after the year 2000 when we shall have used up two-thirds of the world's irreplaceable oil reserves, according to the most optimistic estimates of future discoveries. The world demand for petrol and fuel oil in the 1970s is double what it was in the 1960s and it will again double in the 1980s. Double *that* for the 1990s and keep on doubling till the 2050s and realise that quite soon our motorways will be as empty and unwanted as Beechingized railway tracks.

Even if we use electric cars with batteries recharged over-night by nuclear power stations, uranium itself is irreplaceable, and unlike other energy sources, its "ashes" are dangerous. The orthodox answer to the problem, seriously suggested in the *New Scientist* (7/8/71) is that the rising costs from using tar sands, oil shales and deeper undersea drillings further off shore could be covered by removing all taxation from petrol and oil. Then we can continue happily doubling and redoubling our demand with no shocking price increase to suggest any economy until suddenly, like the seagulls on South Georgia, we have gorged till we can no longer fly—our Concorde and our Tri-stars must stay silent for we will

need their fuel to grow our food.

Before the 1914-18 war, a 30 acre farm needed 10 acres to grow oats and hay to "fuel" the pair of horses that cultivated the land, and our success in feeding a higher proportion of a far larger population in the 1939-45 one came only partly from better crop varieties and more fertilisers. The major gain was from adding a third to our acres by replacing horses with tractors. But if land must grow fuel it cannot grow food, and much of our aid to undeveloped countries consists of selling and giving them the machines that live on the world's capital of fossil fuel, not its income of growing crops, and wind and water power.

It is fashionable to think of food for a hungry world and the problem of too many people and too few acres as easily solved by smaller families for the 2,600 million of us with incomes averaging £75 a year. It is still more fashionable to talk of the pollution cars and aircraft cause but not of how they are starving those who will live only a hundred years from today by slashing the world's farm acreage by a third, apart from the fuel for the irrigation pumps and all the other aspects of food production that depend on fuel. We, the greedy 1,000 million with our average of £1,000 a year each, need a coil in our car factories and a pill for the aircraft industry, because our steel and aluminium "children" are devouring the world's resources.

Let us consider a family of "get-away people" who put three gallons of tiger in their tank each week-end. If they had to grow their own fuel, they would need 175 lb of potatoes distilled to 3½ gallons of alcohol to take them the same distance. This is roughly 85 feet of potato rows of 20 feet of the bed on each side of the path of the average semi-detached house, just for a single Sunday trip. On a farm scale with a 16 ton an acre yield that is 3,585 gallons of tractor fuel from the five acres that would feed a horse, so potatoes are a better bargain in terms of land.

An even better one could be methane gas, fermented from straw and farmyard slurry. An acre of wheat produces about two tons of straw, now burned behind the combines with its energy thrown to waste. This will produce 6,480 cubic feet of methane, equivalent to 40 gallons of petrol, from the wasted byproduct of our daily bread. The humus from that straw however has a

job to do on the land, for it must provide the power that drives the worms, soil bacteria and fungi, and methane production could be as harmful to the land in the long run as straw burning. No one knows yet but we could find out when, before it is too late.

The hay powered horse, however, wins when pulling 50 tons of cargo in a canal barge for a whole year on the produce of his five acres, at a steady 2 mph. In the energy starved world of the future we shall have to glide our goods along on water, rather than thunder them fast on roads. The man, his wife and his family who work that 50 tons slowly through the locks of a cleaner, greener England will have to be fed, clothed and housed just the same if they spend their time watching TV in tower block flats, using energy for lifts and water pumping which they would not on a floating home. They might well find it far more fun.

Unlike 32 ton lorries, barges grow on trees, and the energy to saw the oak, beech and pine that builds them and forges their ironwork is written off in over a century of useful life. The sailing barges that were the oil tankers of the past had the same long life and low energy cost when two men and a boy each took them up the Thames with 120-200 tons of hay from Essex acres to power a horsedrawn London. Like all sailing vessels they "burnt" rope and canvas, and the captain of Britain's last three masted cargo schooner calculated that the wear on sails and cordage cost as much (in the 1930s) as diesel oil for his auxiliary to make the same voyage under power. But diesel oil is irreplaceable, and flax for sails and hemp for halliards grow on the land. Nylon and Terylene wear longer but take more fuel to make.

We need research on the long term effect of straw slurry on the land and pilot plants for the straw powered farms of the future with tractors designed to run on methane in cylinders, or ethanol and alcohol from "grown" rather than fossil fuels. Small windmills like the old Lucas "Frelite", and water turbines for streams deserve research and offer far better export prospects than the Concorde at far less development costs. America has just brought back the crystals that may show how the moon began. It is time that Britain took a long step ahead for Humanity and found out what we, the people of the Earth, can do when the fuel finishes.



Towards a unified science

The four-dimensional model

Behaviour, at all levels of organisation, is best understood as based on a model of the relationship between the system and its environment, *ie* of the larger system of which the former is a part.

If behaviour is to be adaptive, this model must permit the prediction of systemic changes, which is only possible if it is dynamic or four-dimensional.

Thus, if a zebra identifies a moving object as a lion, it may succeed in escaping because it is capable of making a prediction regarding the unpleasant consequences of remaining within reach of the hungry predator. When a baobab fills its pores to capacity with water, it is on the basis of a prediction that there is a likelihood of drought in the months ahead. When a warbler decides to migrate, it is because it has predicted that cold weather is ahead. When the green turtle leaves the coast of South America on its three thousand mile journey to Ascension Island, it is predicting that, by laying its eggs there rather than elsewhere, its young will enjoy the best chances of survival. When a rat tries to find its way out of a maze by taking one route rather than another, it is on the basis of a prediction that this route, in terms of its fast-developing model of the system, is more likely to lead to success than is any other. Every action taken can, in fact, be regarded as based on a series of predictions of ever increasing precision. Thus, when a man reaches for a glass of whisky and lifts it to his lips, this is on the basis of a series of predictions that each move will bring the delectable liquid that much closer to its destination, in the same way that a guided missile, in following its trajectory towards its target, is basing each successive move on its "prediction" as to the latter's whereabouts in relation to itself. Empiricists will object to the fact that I am using the term "prediction" to

apply to things that are, or rather, look, very different, such as men, zebras, baobabs, warblers, turtles, rats and guided missiles.

However, if the term "prediction" is to have any meaning in a scientific context, it can only be used to apply to processes that are functionally similar; the Empiricists' subjective definition being valid only for the special requirements of everyday conversation. Basically, what I am saying is that *a model must be four-dimensional, or dynamic, for the simple reason that the world is best represented by such a model, and that a static, or three-dimensional one will not lead to adaptive behaviour.*

The same principle must be true of a scientific model, whose function is also to permit a special type of behaviour, differing from those we have considered in that it is designed to permit more precise behaviour. Undoubtedly, in its early descriptive stage of development, our knowledge of a particular aspect of the world is achieved by the sheer accumulation of data, no effort being made to organise it. *However, such information cannot be made use of to determine adaptive behaviour. For this to be possible, data must be organised into a four-dimensional model, which involves determining and properly formulating in terms of measurable variables the principles, which, in this particular field determine change.* The achievement of this stage of scientific development has been hindered in many disciplines by the influence of empirical method.

Von Bertalanffy writes:

"Science in the past (and partly in the present), was dominated by one-sided empiricism. Only a collection of data and experiments were considered as being 'scientific' in biology (and psychology); forgetting that a mere accumulation of data, although steadily piling up, does not make a science."¹

Wannier recognises the essential

four-dimensional aspect of physics and contrasts it with other disciplines such as crystallography that are at a purely descriptive stage:

"Crystallography provides a geometric analysis of the solid state, which is unusual in its beauty and perfection. But it is not yet physics, Johann Kepler's laws of planetary motion, which had a similar beauty, were not physics but astronomy; Newton transformed them into physics by finding the law of force to which the planets were subject. In the same way, physicists asked what forces made the atoms in crystals arrange themselves as they did, and what dynamic phenomena took place in crystals. They learned that the forces responsible for the formation of atoms, molecules and crystals are electrical, which placed solids and molecules on a similar footing."²

Odum shows how the variables used by ecologists have slowly become less descriptive and more dynamic:

"Until recently, ecologists were content to describe how nature 'looks' (sometimes by means of fantastic terms!) and to speculate on what she might have looked like in the past or may look like in the future. Now, an equal emphasis is being placed on what nature 'does', and rightly so, because the changing face of nature can never be understood unless her metabolism is also studied. This change in approach brings the small organisms into perspective with the large, and encourages the use of experimental methods to supplement the analytic. It is evident that so long as a purely descriptive viewpoint is maintained, there is very little in common between such structurally diverse organisms as spermatophytes, vertebrates and bacteria. In real life, however, all these are intimately linked functionally in ecological systems, according to well-defined laws. Thus the only kind of

general ecology is that which I call a 'functional ecology', and this kind is of the greatest interest to all students of the subject, regardless of present or future specialisations."³

The same principle applies to the organisation of data relevant to the behaviour of societies. In this respect, historical material is still arranged in chronological order, with little attempt to organise it into a model of any kind.

Anthropology, on the other hand, which deals basically with the same raw materials, is slowly attaining a higher stage of development, as this material becomes organised into a four-dimensional model.

As Murdock writes:

"...the anthropological study of social structure has gradually been emerging from its classificatory or typological phase, and...the changing emphasis which we can currently observe are characterised for the most part by common concern with dynamics or process..."⁴

To understand this process, one must first understand the nature of human organisations, and of the function of the cultures that man develops. One must recognise that:

"...cultural change, like organic evolution, proceeds, not haphazardly, but according to a definite dynamics. Among the specific processes involved, three basic ones are today generally recognised: (1) the process of cultural innovation, most recently analysed by Barnett;⁵ (2) the process of cultural borrowing, whose dynamics have most clearly been set forth by Dollard,⁶ and (3) the process of readjustive integration (e.g. see Linton, 1936)."⁷ ⁸

The formulation of these laws of change ensures the development of four-dimensional models permitting predictions displaying that precision required for scientific purposes.

Edward Goldsmith

¹ Von Bertalanffy, L. "General Systems Theory A Critical Review", in General Systems Year Book, Vol. VII, 1962.

² Wannier G. H., "The Nature of Solids", in Scientific America, December 1962.

³ Odum, Eugene, "Fundamentals of Ecology", Preface, p. IX. W. B. Saunders, London, 1957.

⁴ Murdock, G. P., "Culture and Society", Pittsburgh University Press, 1965.

⁵ Barnett, H. G., 1953, "Innovation", N.Y.

⁶ Miller, N. E. and Dollard J., 1941, "Social Learning and Imitation", New Haven.

⁷ Linton, Ralph, 1936, "The Study of Man", N.Y.

⁸ Murdock, G. P., *Ibid.* p. 154.

Poem

POLLUTION

The air we are breathing will strangle,
The food that we eat is impure,
The water we drink will be strengthened
With pesticide, spray and manure.

Electricity's what we all live on,
But the luxury's costing us dear—
The energy of dying atoms
Is heating the seas year by year.

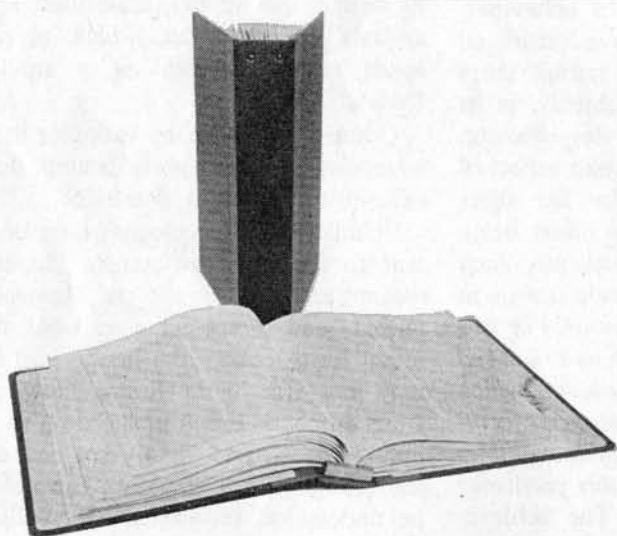
Burnt gases are here all around us—
The oxygen content's gone down.
Motor cars make more pollution
In the dirty-dark streets of the town,

We're killing off all of our wild life
With fish in the poisonous streams,
And our power is nearly all used up
In even more nauseous schemes.

My friend, it's not your world you're killing,
But God knows that that's bad enough.
People! Just think of your children,
It's we who must live with this stuff.

The effects of your deeds are long-lasting,
Your children won't suffer it all.
The clouds of black smog overhead us
Are the earth's threatening funeral pall.

Wendy Jowitt (aged 14)



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ecology action

Friends of the Earth's Schweppes Campaign

Aims of the Campaign

The aims of the campaign are to persuade Schweppes to revert to their policy of using only returnable bottles in the bottling of their soft drinks, and by doing so to encourage other manufacturers to do likewise.

Reasons for the Campaign

The Glass Manufacturer's Federation estimates that by the end of 1972 throw-away soft drink bottles will be produced at the rate of 450,000,000 per year. In this country the largest soft drinks manufacturer which has switched a sizeable proportion of its production to throw-away bottles is Schweppes — part of Cadbury-Schweppes Limited.

Schweppes is a successful and powerful concern which has, by brilliant use of advertising, increased both its size and its reputation. Now, to safeguard that reputation, Schweppes should revert to their former sensible policy of using returnable bottles. There are precedents for such a change of mind: In the USA Coca Cola made the same mistake as Schweppes. Almost entirely in response to public pressure, Coca Cola have since reverted to returnable bottles, and have even put a deposit on their cans.

With appropriate pressure, responsibly applied, Schweppes can set an example to other manufacturers in the UK.

Summary of the facts behind the Campaign

(taken from FOE Report to the Shareholders of Cadbury Schweppes: June 1971.)

A. Consumer Demand

When, only a few years ago, non-returnable soft drink bottles came on the market, their appearance was in no way in response to consumer demand. The public had not asked for them. The reason non-returnables were 'successful' was that in many shops and in most supermarkets there was quite suddenly no choice but to buy them. If the consumer wanted soft drinks, then in most cases, he had little choice but to buy them in non-returnable bottles.

B. Cost to the Consumer

i. Cost on Resources.

We do not know the average number of trips of a Schweppes returnable bottle, but an average of 20 seems reasonable judging from milk bottles and returnable bottles in other countries.

Thus, with the change in bottling policy, each returnable bottle must be replaced by 20 non-returnable bottles, the production of which requires an equivalent increase in the use of raw materials and energy. The quality of the product remains unaffected, but the packaging technique, in that it involves the consumption of raw materials, has an impact on our resources which by far outweighs any marginal and short-term convenience non-returnable bottles may bestow. 20 times more energy consumed means more oil spills, more pylons, more pump-storage units, more flooded valleys. 20 times more raw materials means more quarrying or dredging, more noise, more fuel consumption, and more polluting by-products.

ii. Cost of the Bottle

When a returnable bottle is used for packaging soft drinks the same bottle may be used many times, and hence the cost of each bottle is spread over a large number of consumers.

When a one-trip bottle is used the cost of the bottle is passed on directly to the one consumer who buys it. Its cost is not spread over a large number of consumers so the price of the non-returnable bottle plus soft drink increases.

The ration of the cost of the package to the cost of the contents also increases. In fact a packaging expert has indicated to us that it is likely that the non-returnable bottle costs more than the soft drink inside it.

On April 13th, 1971, Schweppes increased the price of all their soft drinks by 1p per bottle. Reasons given for this were the increase in the cost of raw materials, steel, packaging, fuel, glass and fresh fruits. Whilst a change in packaging policy would in no way affect the price of fresh fruits, it would most certainly affect the expenditure on other items listed by the Directors' spokesman. By reducing the unit production cost, a reversion wholly to a system of returnable bottles would be economically advantageous to the consumer as well as environmentally sound.

iii. Cost of Refuse Disposal

Not only does the consumer have to pay for the non-returnable bottle when he buys it but he has also to meet the cost of its disposal. The cost of disposal does not fall directly on the consumer of the soft drink but is passed on to the whole community who pays for refuse disposal via their local rates. In 1967-68 the cost of refuse collection and disposal paid for via local rates and government support grants amounted to £66 millions. By 1969 this figure was expected to have increased by 50 per cent.

iv. Cost of Litter Clearance

In the United Kingdom over £20 million per year is spent on litter

clearance. At the same time large sums of money are spent by companies such as Schweppes in stressing the convenience attached to throwing away bottles. It is in no one's long term interest for such a 'throw-away' philosophy to become the attitude of the day. The fact that non-returnable bottles are manufactured to be discarded has far more effect on the attitude of consumers than does Schweppes' plea that the bottles should be disposed of in a sensible fashion.

Schweppes' much-publicised donations to the 'Keep Britain Tidy' Group in no way compensate for the problems created by their policies.

Friends of the Earth have mounted a campaign to persuade Schweppes to revert to returnable bottles. Details of this campaign can be obtained directly from FOE, King St, London, WC2. In the meantime, they desperately need *your* help!

THINK!

Don't buy non-returnable bottles. Whilst there are many ways in which effective action can be taken at either a local or national level by any individual or group, the most positive form of action which can be taken against Schweppes—because of the drastic impact which will be felt by that company—would be to boycott all Schweppes soft-drinks that are now sold in non-returnable bottles

These include:

Schweppes Mineral Waters.
—Indian Tonic Waters
—Ginger Beer
—Dry Ginger Ale
—Bitter Lemon etc

Slimline Sparkling Drinks.
—Slimline Tonic Water
—Slimline Golden Orange Drink etc

Cresta
—Orange
—Pineapple
—Strawberry etc

Pepsi Cola
Zing
—Lemonade
—Raspberry etc

Rethink your purchasing policy.

Wherever possible, refuse to buy any goods which are unnecessarily

packed in non-returnable containers. Never buy goods which are over-packed.

Recognise the Alternatives:

Alternatives exist. Corona Sparkling Drinks, for instance, are marketed exclusively in returnable bottles. In most cases the alternatives are cheaper than the equivalent Schweppes drinks.

Patronise small shops.

It is often only small grocers' shops which, in the age of the supermarket, stock soft drinks in returnable bottles. Patronise them. If they (and the personal service they provide) are to survive they need your custom.

Support the FOE Boycott.

Later in the year, FOE along with many other membership organisations representing thousands of concerned individuals, will call for mass boycott of all drinks in non-returnable bottles. The launching of the boycott will be well publicised. Support it: better still start now.

WRITE

Write to Schweppes.

Viscount Watkinson and his colleagues should be made aware of your concern. You can write to him at Schweppes House, 1-10 Connaught Place, W1. Send copies of all replies that you receive to FOE, 8 King St, London, WC2.

Write to the papers.

Drop a line to the local paper raising the questions of litter caused by inappropriate and excessive packaging, and the increasing burden placed on the refuse disposal facilities. Send a copy to the local radio station.

Write to the Local Council.

Discover how your local council is coping with refuse. What are they doing with it? Chapel en le Frith Rural District Council have called for a levy on non-returnable bottles. What is the attitude of your local council? Send FOE copies of whatever replies you receive.

Write to the Supermarket.

Write to the manager of any local supermarket which stocks drinks in non-returnable bottles. Ask him why they adopted that policy. Point out the problems. Ask that he replace these drinks with others, the bottles of which

can be returned. If he declines, ask him for his reasons. Tell him that you and your friends will refuse to shop there. Then send replies to FOE.

Write to the Keep Britain Tidy Group.

Congratulate the KBTG on its support for the recent scheme whereby a sweet manufacturing company will buy back sweet wrappers for re-use. Demand that they make a long-overdue statement on the undesirability of non-returnable bottles. Ask the KBTG whether the donations they receive from Schweppes, or the presence of a Schweppes representative on the KBTG's Executive Committee have inhibited the Group from making a clear statement of policy on non-returnable bottles. Send your replies to FOE.

TALK.

Ban non-returns from your Union.

Students and other Union members have a special role to play. Debate the issue at your next Union meeting. Persuade your Union not to stock non-returnable bottles. Let FOE know how you get on. Publicise your boycott.

Make it National Policy

It's about time the National Union of Students, for one, involved itself in environmental issues. The Refuse Disposal Report of the NUS Committee for the Environment presented to the Countryside in 1970 Conference, pointed that way. Now local unions should table motions for debate at NUS Conference. The NUS now has a Conservation Officer: ask him for his help.

Implement Existing Policies.

It is not enough just to adopt a policy—it has to be implemented. The recent meeting of the National Federation of Women's Institutes called on women to refuse to buy non-returns where alternatives exist. The vast majority of shoppers are women. If all the WI members stopped buying soft drinks in non-returnable bottles, companies like Schweppes would be forced to reconsider their policies.

Discuss the Issue at Ward Meetings.

Ward meetings of political parties provide an ideal forum for the debate of issues like this one. Persuade your Ward to put forward a motion calling for the introduction of legislation to

outlaw the unnecessary use of non-returnable bottles. Let FOE know how you get on.

COLLECT

Collect Schweppes Bottles.

The best way of focussing public attention on the stupidity of discarding re-usable bottles is to collect them and return them for re-use. FOE made the point in May. By the end of October we shall be in the position to ram the point home. Bottles will be returned not only to Schweppes head office, but also to their regional offices, which appear below:

Schweppes (Home) Ltd

Birmingham:	Hansons Bridge Road, Birmingham 24.
Bristol:	Emery Road, Grislington, Bristol 4.
Cardiff:	Hadfield Road, Leckwith, Cardiff.
East Kilbride:	52, Milton Road, East Kilbride, Glasgow, Scotland.
Fareham:	Broad Cut, Wallington, Fareham, Hants.
Gateshead:	Kingsway South Team Valley Trading Estate, Gateshead 11, County Durham.
Leeds:	Geldred Road, Leeds 12.
Liverpool:	Long Lane, Liverpool 9.
Sidcup:	Cray Road, Sidcup, Kent.
Head Office:	Schweppes House, Connaught Place, London, W2.

So far we have eight regional co-ordinators of the deliveries to Cardiff, East Kilbride, Gateshead, Kent and Leeds. FOE centrally will handle head office.

The co-ordinators' addresses are:

Stewart C. A. Hildred, 157 Tinshill Lane, Leeds, LS16 6EE.
Philip Taylor, 7 Burnside Felling, Gateshead NE10 9NY.
Geoffrey Kerr, 160 Norwood Road, Southport, Lanes.
David Towell, 281 Manor Green Moor, Moseley, Birmingham.
M. A. Chappell, "Y Bnthy", Llanfair Discoed, Chepstow, Mon.
Stephanie Tyler, Field Cottage, Lanhill, Chippenham, Wilts.
David Bowie, Coombe Bank, West Moors, Wimborne, Dorset.

If you live in these regions get in touch with them and give your help.

Co-ordinate the delivery in your region.

Co-ordinators are still needed for the other four regions. If you live near these centres then help in the work. Write to us and volunteer. FOE is not another talking shop. Words without action are useless. FOE in London will give you all the help and advice you need.

Go bottle hunting.

There is no shortage of Schweppes bottles. They can be obtained from cafes, restaurants, and theatres, from which you can collect them regularly. They also make regular appearances in dustbins, parks, picnic sites, and on beaches. Pick up the broken ones if they are left lying around. They will have to be sensibly disposed of. The whole ones can be re-used, and should be retained for delivery or passed on to the co-ordinators.

The exact date of the delivery will be made public in October, but collectors should aim at a completion date of 20th October. The target for each region is 1,500 bottles.

FEEDBACK

Keep in touch.

FOE's borrowed telephone extension (on 01-836-0718) is always busy. The best way of keeping in touch with developments is to write to the office. FOE should be kept informed of all developments, and should be sent copies of any letter which you think we should see.

Coming events

4-8 October—Annual Conference of the Association of Public Health Inspectors, Eastbourne. Details from 19 Grosvenor Place, London W1. Tel. 01-235 5158. Details of the environmental health exhibition held in conjunction with the conference from Brintex Exhibitions, 3 St. Clement's Place, London WC2. Tel 01-242 1200.

12-13 October—Water Pollution Research Autumn Lectures on "The design of sampling programmes", "Sludge treatment and filtration", "Population dynamics in the activated-sludge process" and "Fisheries and pollution". Cost £18 including course papers and lunches. Apply to the Director, Water Pollution Research Laboratory, Elder Way, Stevenage, Herts. SG1 1TH.

13-18 October—1st international exhibition for the protection of nature and its environment, Parc des Expositions, Rouen. Details from Protecna, 48 Quai de Paris, 76 Rouen, France.

14-21 October—Milieu '71. Exhibition for environmental control techniques. Utrecht, Holland. Details from Exhibition Consultants Ltd., 11 Manchester Square, London W1. Tel. 01-486 1951.

18-24 October—UN Assoc. Lancing/Sompting UNA Week. "The Environment". Speakers include Keith Suter, National Chairman of UNA Youth. Details from S. Cookson, Trelawny's, Sompting.

19-23 October—National Society for Clean Air Southport Conference. Speakers include Eldon Griffiths MP, R. E. Boote, and Sir Kenneth Hutchinson, President of the Society. Details from the National Society for Clean Air, 134/137 North Street, Brighton BN1 1RG.

27 October—Pollution: the sources of information. One-day conference at the Library Association Headquarters, 7 Ridgmount Street, London WC1. Details from G. Mort, Somerset County Library, Mount Street, Bridgwater, Somerset. Tel 0278 51201.

15-19 November—Antiquamento/Antipollution 71, conference on environmental pollution, Milan Fair, Milan, Italy. Details from the National Society for Clean Air, 134-137 North Street, Brighton BN1 1RG.

29-30 November—Discharge of Industrial Effluents to Municipal Sewerage Systems. Symposium. London. Enquiries and correspondence: Mr. V. H. Lewin, Symposium Secretary, National Symposium, The Institute of Water Pollution Control, Heyford Hill Cottage, Littlemore, Oxford. Tel. Oxford 78101.

2-4 December—International Symposium on Energy, Man and the Environment, Zurich, Switzerland. Details from Gottlieb Duttweiler Institute for Economic and Social Studies, The Green Meadow Foundation, CH-8803 Rüschlikon, Zurich, Switzerland.

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	John Noble and Harry Rothman	PCB <i>The by-product of industry and possibly a serious threat to our wildlife</i>

THE ECOLOGIST, 73 Kew Green, Richmond, Surrey

Feedback

1 New Bill to protect developers

A few successful battles against reservoir schemes have been fought. One of the most recent has been against Swincombe in Devon in which Lady Sayer conducted a formidable campaign. Under existing law a private bill has to be put before Parliament before such schemes can go ahead. It is immediately a national public issue with a free vote.

"River authorities and water undertakings are pressing for a scheme in which a ministerial order is automatically invoked, so that any proposal for abstracting water on a large scale becomes a matter of government policy. They can argue eloquently for the advantages. There are savings in time and cost. One argument is that even the conservationists would save themselves large sums needed to brief silk to oppose the schemes. Eloquence tends to fade when describing the course open to objectors under a different scheme. The issue is reduced to a local inquiry at which an inspector calls for such evidence as he thinks relevant. There are no rights on the part of the objectors to be seen or heard. The local opponents, complete with mud on their boots, if you like, can be seen without much difficulty as no match for the experienced administrative machine."

Source: "Environment" by Pearce Wright *The Times*, 31.8.71.

2 Mercury Again

The oyster industries of Tasmania and New South Wales are threatened by mercury pollution. A study estimates that the entire Australian seafood industry could be wiped out in 10 to 15 years' time. Mercury levels are already much higher than desirable. Professor H. Block, Head of the Chemistry Department of the

University of Tasmania, who has undertaken the study, recommends urgent and drastic action.

The River Rhine is estimated to carry 70 tons of mercury into Holland every year, mainly from industrial waste and domestic refuse.

The highest mercury content is found in fish from inland waters. In the case of ocean fish the mercury content is less with the exception of tuna. Research has also shown that mackerel caught in the Atlantic sometimes contains five times as much mercury as mackerel caught elsewhere.

Professor van Genderen, professor of Veterinary Pharmacology and Intoxicology at Utrecht University, says that the number of terns (sea birds) has declined sharply in recent years and an increasing amount of mercury has been found in them.

A study is now being made into the possible influence of mercury on the reproductive organs of these birds.

Source: Reuters.

3 Puffins in Peril

St. Kilda, the remote island group off the Outer Hebrides, has long been regarded as the stronghold of the Puffin in the British Isles. Its population was once an estimated three million pairs. In the last seven or eight years, there has been a dramatic population fall to $\frac{1}{4}$ million pairs. Predators, food shortage and disease seem to be ruled out as causes. Some toxic marine pollutant or perhaps a combination of them appears to be responsible. The British Trust for Ornithology, the Royal Society for the Protection of Birds and the Seabird Group are all gravely concerned and are looking into the problem. It was at St Kilda that our last Great Auk died. It is to be hoped that the Puffin will not be allowed to follow it into extinction.

Additional information from Dr Jim Flegg, The British Trust for Ornithology, Beech Grove, Tring,

Herts. Tel. No. Tring (044 282) 3461.
Source: BTO Press Release. 16.9.71.

4 Communist GNP

The Central Committee of Poland's Communist Party adopted on Saturday, 4 September, a new set of directives for economic and social development. According to this, real wages are to rise between 17 and 18 per cent between 1971 and 1975. This is about double the increase in the past five years.

Clearly the communist countries are not exempted from a fixation with economic growth.

Source: *The Guardian*, 10.9.71
and editorial comment.

5 The Voice of Reason

This was the title of one of the most naive and irresponsible articles to appear in the British Press for a long time. Mr Woodrow Wyatt does not consider this island is over-crowded, nor that there should be any government sponsored birth control measures. He writes: "I am all for the British population mounting", he also adds: "If there is not enough room in Britain for comfortable living there is plenty of space in Canada, Australia and New Zealand. The time to start worrying is when those areas are full."

Source: *Daily Mirror*, 21.5.71
and editorial comment.

6 The Real Voice of Reason

South Australia's Minister for Conservation, Mr Glen Brownhill, has stated that Australia's intake of migrants, especially from Britain and Europe, should be slowed down. Speaking at a science symposium on pollution at Adelaide University, he said there was evidence that sheer weight of human numbers meant contamination of earth, air and water. "While thousands of Britons and

Europeans are pouring in (to Australia) our schools are unable to cope and without some massive change from Canberra, this condition will persist for decades at least," he said. "Our numbers have already started to outrun our capacity in many areas. In many capitals, but more particularly on the outskirts of Sydney, Melbourne and Canberra, population growth has left public services well behind," he added

Source: *Reuter*, 14.8.71

7 Breast-Fed Babies Resist Infection

Newborn infants fed breast milk appear to derive an immunity to early bacterial infections that babies on cow's milk formulas never receive, two Swedish pediatricians recently reported in *The Lancet*.

In a study at two maternity clinics in Goteborg, Drs J. Winberg and G. Wessner compared the diets of 33 newborn infants with meningitis or urinary-tract infections and 66 infection-free infants in a matched control group. They found that those babies who developed blood infections between the fourth and tenth day of life were getting significantly less breast milk than the controls, because their mothers were suffering from hypogalactia (a deficiency of milk secretion). Aware that the bacterial toxins present in the infected infants' blood were originating in the intestine, they suggested that "The factors which normally prevent bacteria from penetrating the gut wall are unknown, but breast milk may be of some importance".

The pediatricians theorised that colostrum—the thin milky fluid (or first milk) which is secreted from the mother's breast immediately after childbirth—somehow protects the breast-fed newborn from coliform septicemia (blood infection). Specifically, they suggested that certain antibodies in the colostrum were responsible since "their ability to pass through the gut wall with well-retained antibody activity" has already been established.

The pair expressed reservations about the desirability of standard cow's milk formulas, concluding that: "The supplementation (using cow's milk) is probably a common and often unnecessary custom in many Swedish hospitals. One might speculate what such an unphysiological early load of

calories, salt and foreign protein to a large part of the population might mean for the general health of growing infants, especially since this hospital custom may be continued at home by the mother."

Source: *Rodale's Health Bulletin*. Vol. 9, No. 13.

8 British Roads the Most Crowded in the World

Traffic in Britain has doubled since 1958. Britain's roads are the most crowded in the world with 62.6 vehicles for every mile of road. There is less than 3½ yards of trunk and principal road, including motorways for each vehicle in Britain. Accidents cost £320 millions in 1969 with 2.90 casualties for every million vehicle miles.

By way of consolation we are informed that the net increase in cars on the road is 288,300 last year, the smallest since 1953.

Source: *The Guardian*, 8.9.71

Also see "Basic Road Statistics 1971, British Road Federation, 26 Manchester Square, London W1., 50p.

9 Death Spray

The death of a boy aged nine has been attributed to aerial spraying of pesticides. Charles Thompson is supposed to have been sprayed several times on July 14 in a cucumber field in Rosenhayn. The first symptoms were vomiting and swelling of the face. He was first treated for asthma. The swelling disappeared overnight. Two days later his arms, legs and chest started swelling. He was transferred to a children's hospital in Philadelphia, where he died last Thursday. Hospital officials stated that the poisoning by insecticide, destroying the lung tissue provided a working diagnosis of the cause of the death. However Dr Kriner, an expert at the College of Agriculture and Environmental Science at Rutgers, the state university, expressed doubt that the sprays usually used on farms in New Jersey could cause the boy's death.

Source: *Times*, 7.9.71.

10 Tritium pollution

Tritium, an isotope of hydrogen, is a by-product of nuclear power plants. It is formed both within atomic piles and from neutron bombardment of

water molecules in the cooling systems of the nuclear plants. Small amounts are released into the environment as tritiated water.

A University of Chicago radiologist, Dr Dieudonne J. Mewissen, says that amounts of tritium some 50 times less than the maximum permissible level for power plant effluents, as established by the Atomic Energy Commission, causes cancer in mice.

In a study, Dr Mewissen gave 1,500 new-born mice either tritium-labelled thymidine, a component of DNA, or normal, non-tritiated thymidine. Mice in the tritiated group had a higher incidence of malignant tumours throughout most of their lifetimes.

Dr Mewissen says that if the tritium became concentrated in the nucleus of human cells because of an affinity for thymidine, then these nuclei could receive far higher doses of radioactivity than the gross amount of tritium in the body would indicate.

But he admits many more factors must be investigated. These would include: the exact amounts of tritium released from the power plants, the proportion of the tritium retained by the DNA of men and animals, and the varying concentrations of tritium as it advances up the food chain.

Science News, Vol. 99, No. 16.

11 Nuclear Diplomacy

Peru will break off diplomatic relations with France if it explodes another nuclear bomb in the South Pacific, President Alvarado said yesterday.

His government had decided on such a step after scientists' reports that radioactivity from the explosions caused high contamination of the atmosphere and could cause genetic damage to humans.

Daily Telegraph, 26.8.71

12 Threat to crayfish

Surveys carried out this month show the crayfish is now in danger of becoming extinct around Cornwall. In the first six months of this year more than £18,000 worth of this delicacy was landed at Cornish ports. How long can this be kept up? The Minister of Agriculture and Fisheries, Mr Prior, may be asked to impose a winter close season on all shellfishing. The request comes from the harbour commission at Sennen.

Daily Telegraph, 26.8.71



The Poor get Children

The State of Food and Agriculture 1970. FAO, Rome. Available from HMSO, £3.

The world food problem is getting worse, not better. This is the clear message contained in the latest annual report from the Food and Agriculture Organisation of the United Nations.

This is not to say that food production has not increased; it has. The problem is that population has increased at the same rate. The graphs that compare the two show nearly parallel lines. In fact, in the period 1959-61 to 1967-69, per caput food production in Latin America rose by 0.1 per cent per year, in the Far East it decreased by 0.1 per cent per year, in the Near East it increased by 0.3 per cent per year and in Africa it decreased by 0.4 per cent per year.

The figures may not sound significant. If people were not eating better, at least they were not eating much worse than they did a decade ago—in many cases they ate better in the 1930s. This is true, and a great deal of the credit must go to the FAO. It is also misleading. The FAO hoped for an increase in incomes in developing countries that would go some way to closing the gap between the rich and poor countries and which would create an increased demand for food. The real significance of the figures is that either incomes have not risen, or the increased demand for food has not been met. People may be eating as much, or as little, as they did, but in world terms they are poorer because in the same period the rich countries have added to their prosperity. The gap continues to widen.

In its plans for the "Green Revolution", the FAO laid great stress on the new high-yielding varieties of cereals.

These required relatively high inputs of water and agrochemicals. It is unlikely that these inputs are available in quantities sufficient to produce any major long-term benefits on a world scale, but at least some short-term advantage might have been expected. It has not happened. The new varieties are not being introduced. The new rices have been planted more widely and more rapidly than any of the other crops, but in the Far East, the area most affected, the latest figures show that no more than 7 per cent of the total rice area has been sown to them. Already they have run into ecological problems, problems of consumer preferences and non-availability of the necessary inputs. Responsibility for this must lie partly with the developed countries that have chosen not to divert resources for this purpose and partly with the developing countries that have not provided the infrastructures that would have ensured the equitable distribution of what there was.

Even if it were successful, the "Green Revolution" is no more than a short-term expedient. If more food is to become available, then populations must be limited. This may not be possible until the rich countries accept their own responsibility and recognise that they must give a lead as an earnest of their good faith and sincerity in urging unpopular measures on the deeply suspicious governments of the third world and as a recognition that their own per caput consumption of the world's resources is unfairly high. Will it happen?

The FAO draws comfort from the fact that at least food production has kept pace with population growth. This is grounds for congratulation, but it is cold comfort. The wolf is never far from the door.

The work of the FAO deserves wider recognition and support from the

people of Britain. Its officials know what the problems are, but they work under crippling political restraints. They can continue at all only by maintaining the goodwill of governments they ought to castigate. Nevertheless, they do publish figures and these tell their own story. Anyone who cares enough about world hunger to urge more responsible policies on our own politicians should have them to hand.

Michael Allaby

Consciousness III

The Greening of America, by Charles Reich. Allen Lane, The Penguin Press, £2.50.

Big changes are coming. Western society has generated a revolt among its young that threatens to topple the whole social and political structure. There is a real possibility that America is close to revolution.

This is the situation Mr Reich sets out to investigate, mainly among students at Harvard, where he teaches law, and from the writings of popular, radical authors. He concludes that the people in revolt are experiencing what he calls "Consciousness III". This needs a little explanation, for he does not mean by "consciousness" what most of us might mean; this consciousness has nothing to do with levels of awareness.

He reasons that the early pioneers in America had "Consciousness I". They set great store by personal liberty and responsibility and believed their land was one in which any man might prosper by honest and pious toil. This led, he says, to "Consciousness II", in which personal liberty gave way to an extreme form of *laissez-faire* economics and what was most highly valued was loyalty, to the flag, the government, the

corporation, "the way of life". In contrast, "Consciousness III" appears to return to the ideal of personal liberty and pleasure. I would prefer to call it a philosophy, or outlook, rather than a "consciousness". As Mr Reich describes it, it is close to what the philosophers would call hedonism.

A large part of the book is devoted to explaining the historical rise of, and need for "Consciousness III". Clearly, he feels it needs justification. America, he says, is unjust, the government and the corporations are cruelly oppressive. They have reduced men to functions. The whole system is riddled with self-contradictions.

Alas, so is Mr Reich's book. He complains of the commercial empires that produce only trivia to be foisted on a dulled public, yet by his own arguments, if the revolutionaries were to create a demand for particular products industry would have no alternative but to satisfy them. It does, of course. They reject commercialism, yet, he tells us, their idols are the stars of pop music, art, economics and political theory. Perhaps he is not aware of the extent to which these stars are themselves entirely commercial products, promoted by expensive, but clever and sophisticated, PR, for profit. If the young did not buy the books and the records they would not be produced. While rejecting commercialism and industry they have discovered freedom such as the world has never known. They have found there are small motor cycles that will carry two people away into the wilderness. There are beaches on which it is possible to lie in the sun, swim, surf, and never do anything else. Without commerce and industry how would they buy their motor cycles, how would they eat?

Mr Reich's love of pop music carries him away at times: "Beethoven seems like a series of parallel lines, sometimes vertical, sometimes diagonal; Mozart a flow of rounded forms, but as few as three rock musicians... can set up a texture of rhythms, timbres, kinds of sounds, emotions that create a world by contrast to which the classical composers seem to have lived in a world of simple verities, straightforward emotions and established, reassuring conventions". There is quite a lot in this pretentious vein. The young, says Mr Reich, have discovered a new world of art that is to do with the interpretation and communication

of the artist's view of the world. And he thinks he has hit on something original or, preserve us, profound!

The tragedy of the whole thing is that either he is pulling our legs or he believes it. The extent to which he has missed the point is monumental. He has observed discontent among young people and he has watched what they do and praised it all. He concludes they are about to overthrow the power structure and substitute their own, based on love, rock and pot. Perhaps, after all, he is pulling our legs. Perhaps his young people were pulling his.

Perhaps they should have told him that they have noticed that western industrial civilisation cannot long continue, not because of its inherent social contradictions and injustices—we all agree about them—but because it is about to run out of resources. When it collapses, so will their motor cycle, pop world. Maybe they are having what they know to be a last fling. Good luck to them!

The rejection of contemporary society, the search for an alternative, these are real enough. If there is an aim it is to find a way of life independent of industry and technology. If it is to hope, naïvely, to create a free world in which we all have motor cycles, listen to pop records and work only when and where we please, it is irrelevant to the real world.

Mr Reich is up a gum tree. Perhaps the students at Harvard are not typical of those at, say Berkeley, where Ecology Action began. Perhaps Mr Reich should visit them; perhaps he should stop reading Marcuse for a moment and try Ehrlich or Dubos. Then he might see he has misinterpreted the *Zeitgeist* and that while there are strong grounds for optimism, what makes him hope makes me despair.

Michael Allaby

The lawful loopholes in pollution

Water Pollution as a World Problem.

The Legal, Scientific and Political Aspects. Report of a Conference held at the University of Aberystwyth. Europa Publications for the David Davies Memorial Institute of International Studies. £3.50.

Bringing together the ecological and

the legal aspects of water pollution in one conference was an invaluable service to those who, like myself, are forever having to delve into two different sources of information to relate the one to the other. Here we find under one cover the views of the scientist, the administrator and the lawyer on pollution caused by nuclear and thermal wastes, oil, chemical and pesticide residues, industrial wastes and sewage with a massive appendix on the Canadian Arctic Waters Pollution Bill, together with the texts of several international agreements on the protection of wildlife. All the speakers have experience in their respective fields, but no less interesting are the contributions to the discussions in which no punches are pulled, in particular the speakers reveal the loopholes and weaknesses both in the law and the political procedures for enforcing it—as for example the advantages that the big commercial enterprise has over the local authorities or local opinion at a public enquiry. One scientist suggests that the protesters at an enquiry should have free legal aid, in presenting their case against potential polluters.

One of the most important discussions is on the incompatibility of the freedom of the seas with pollution control.

A book to be read by everyone concerned with strengthening the laws dealing with water pollution. The David Davies Institute is once again to be congratulated.

Robert Waller.

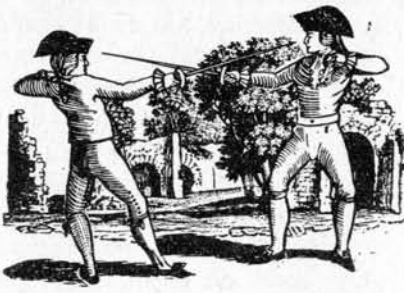
To be reviewed in the November Ecologist:

Superhighway—Superhoax by Helen Leavitt. Ballantine Books. Reviewed by Gerald Foley.

Man and Land, The fundamental issue in development. By Erich H. and Charlotte S. Jacoby. Andre Deutsch. Reviewed by Robert Waller.

Classified Adverts

Scottish Highland Shepherd and his wife, interested in ecology and eager to discuss Land Use in remote areas, would like to offer accommodation for student groups or families through the winter. Beds for 8, floor space and camping facilities for hordes! Part of Old Caledonian Forest on ground. Under hour from Glencoe Ski Lift. Railhead at Crianlarich on London line. Willie and Jan Orr, Strathfillan, Crianlarich, Perthshire. Tel. Tyndrum 223.



Letters

Benefits of Technology

Sir,

Like your correspondent, Mr Sones (August 1971 issue) I too have often pondered the alleged benefits of an industrial civilisation, and like him find them hard to identify. I heartily agree with his point about technology's achievements often amounting to no more than clearing up its own messes. The motorcar for instance has not opened up the countryside to town-dwellers for the first time: before industrialisation grossly swelled our towns, every citizen was within walking distance of countryside anyway.

I suppose the two main claims that could be made for industrial civilisation would be that:

(1) It has in the long run vastly reduced the suffering resulting from sickness, epidemics and famine.

(2) It has taken much of the "drudgery" out of labour.

As regards (1), the claim partly holds good but only to the extent of the contribution that mass production of medicines, drugs, medical equipment, hospitals, sanitation, sewerage etc. has made to medical progress. In theory we might, like the Greeks, have continued to progress in pure science while ignoring the opportunities for its practical application. To what extent medical science might have achieved some of these results without the help of technology is a matter of the purest speculation. A doctor educated in every kind of modern medical knowledge but set down in some primitive territory without a single industrial product—drug or gadget—at his disposal might still be able to achieve wonders within these limitations, even if only by advising people what *not* to do.

Again, while it is arguable that medical technology has saved mankind from the anguish which arises from the death at an early age of children and

dear ones, it has substituted the anguish resulting from overpopulation (as in Calcutta today) or else caused him to limit his family so that he has fewer dear ones to lose anyway—which in some ways seems a bizarre kind of gain.

Above all, it now seems that the increase in mental illness is beginning to outweigh much of the progress resulting from the reduction of physical illness. While it was undoubtedly agony to suffer from bubonic plague, leprosy, sleeping sickness or tuberculosis the nightmare experiences of a schizophrenic are hardly an improvement on them, the main difference being that the latter do not normally come to a merciful end through death.

As regards (2), while technology has indeed abolished *drudgery* (back-breaking labour) it has in many cases only substituted *tedium* (repetitive, mechanical work-processes) again often resulting in mental illness. And there is, of course, the well-known loss of satisfaction in work—to many men their "raison d'être"—in meaningless mass-production processes without scope for personal skill or pride.

As for the effect of most modern labour-saving goods and toys, we should not mistake the creation of a *frictionless* life for a *satisfying* one. The fact that a modern housewife can prepare a meal in three minutes while her forebears might have spent 3 hours on it says nothing for the relative goodness and tastiness of the food or which got most out of life. Indeed, the other activities to which the modern housewife devotes the hours she saves could well give her less satisfaction. Moreover the frictionless life can accommodate a craving for violence: one recalls some of the earliest Mods and Rockers who, asked by an uncomprehending TV interviewer what *made* them engage in violence at a seaside town, replied immediately and unanimously "Boredom".

In short, it seems little gain to have replaced a *laborious* life with a *flavourless* one.

Yours sincerely,

Julian Lessey.

Liberal conservation

Sir,

I have just seen Mr Hugh Heywood's letter (Vol. 1, No. 12, p. 40) on the subject of a Conservation Party and wholeheartedly agree with him that it is more effective to work through the existing political party of one's choice.

As far as the Liberal Party is concerned, I can certainly back up his assertion that it has policies for the conservation of the environment. In fact, at the instigation of Mrs Stina Robson, President of the Liberal Party, it has recently formed an Environmental Panel under her chairmanship to advise the party on these issues. Apart from Liberal politicians with a deep concern for the environment the membership of the Panel is drawn from scientists, architects and others with expert knowledge, regardless of their own political allegiances, if any. All are united by a common desire to help any party which is prepared to do something positive to safeguard the environment and fight pollution.

The Panel has just established several specialist sub-panels to study various aspects of this complex subject and these have already started work. As a member of the Panel, I know that the Liberal Party is determined to face up to all the problems of the environment, both within and without the United Kingdom, and will work out realistic policies.

In November, 1970, the Liberal Party held a weekend conference on environmental pollution and the proceedings

are due to be published in book form next month. I am, Sir,

Yours faithfully,

John Burton,

8 Pill Way, Clevedon, Somerset.

Rudderless Ecologist?

Sir,

Your editorial for August, 1971, "The Vessel Without a Pilot" clearly suggests that you are unable to explain what measures should be taken to save us from disaster, yet you believe it will take a long time to bring your society once more under control.

The Ecologist is not scientific; it is like a vessel with a pilot yet without vision or understanding, using the rudder to avoid pollution, etc. All governments are doing likewise with the result of the World's march to oblivion like your cartoon of the Pilotless Plane. Society has indeed got a pilot; although he is at the controls yet he does not know what to do. To be scientific, *The Ecologist* should realise how society works and for what! Exploitation based on finance, defence, etc. etc. Briefly, how can you solve the problems of this society by continuing this society that creates the problems?

Therefore, *The Ecologist* should promote education on these priorities: the conservation of our natural resources, which are: air, soil, forests, minerals and water. These are not inexhaustible; we are only custodians of this wonderful wealth and we should use it wisely without waste, and leave it well for those who come after. Also all production for use and needs only for all peoples irrespective of sex, colour or race.

As soon as all citizens of the world get to grips with this philosophy, they will quickly change our society into an enthusiastic endeavour to make this planet into a healthy and happy state without having to wait a long time to bring our society once more under control.

Yours faithfully,

George E. Jackaman.

"Meadway", Butlers Dene Road,
Woldingham, Surrey CR3 7HG.

Ecology in Canada

Sir,

As the population increases into the 60 millions, and as the great god growth

continues to be deified by all political parties, it was heartening to see the appearance of your magazine on Canadian book-stalls. During my residence in Canada, I have studied environmental issues avidly and entered a course entitled "Man and His Environment" at the University of Waterloo. I have joined the major Canadian Environmental group—Pollution Probe which was established by the University of Toronto students in 1969 and has since spread to over 100 cities and towns. Membership across Canada has been conservatively estimated at a quarter of a million persons. Among our successes, including the banning of DDT, aggressive pressure and public concern led to the creation of a Ministry of the Environment both at the Federal level and in many provinces. Several stringent anti-pollution laws have been passed. Enforcement will be another question.

Two off-shoots of Pollution Probe are the Canadian Environmental Law Foundation and Zero Population Growth. I hope that the British Ecological Movement will move likewise from strength to strength.

Ecologically Yours,

Sean Casey.

26 Argate Place, Scarborough, Ontario,
Canada.

Birds of Prey

Sir,

I would like to bring to your notice our new journal *Captive Breeding of Diurnal Birds of Prey* which is intended to provide a forum for all work being undertaken in this important new field in Europe, and a circular giving details of where it may be obtained, which may be of interest to your readers.

In the event of further environmental deterioration it may well be that the setting up of captive breeding populations prove the only means of rescuing some species of raptors from extinction. This is the "Noah's Ark" approach, with a view to eventual rehabilitation of the species in an improving environment, and we are also initiating projects to determine the success of various methods of re-introducing birds of prey to the wild.

It may well be that the only way to save the Duck Hawk, *Falco peregrinus anatum*, in North America is by captive breeding, and Cornell University

has just started a project to set up a captive breeding population of peregrines in a \$105,000 laboratory, the team being led by Tom Cade. Since the USA has refused to ban DDT on the advice of the Environmental Protection Agency, it seems that captive breeding may be the only way of saving most of their large raptors, including possibly the Bald Eagle, their national bird!

Although captive breeding has proved to be beset with difficulties, these are gradually being overcome. This year's peregrines have been "double-brooded" in Germany, peregrine/saker hybrids raised in Eire, and sparrow-hawks bred in Devon, as well as numerous successful kestrel reports. These will be reported in the 1971 issue.

Thanking you for your co-operation.

Yours sincerely,

R. E. Kenward.

Conservation Secretary, The British Falconer's Club, Eden House, Bolsover, Road, Eastbourne.

In the next issue of The Ecologist

Who cares about DDT? Goran Lofroth, an eminent Swedish scientist, examines the latest information on the serious hazards to human health of massive spraying programmes.

Economics & Ecology. Philip Brachi, British economist, challenges the basis of cost benefit analysis and other current economic concepts.

The Hill Tribes of Assam. S. Barkatki, an authority on the people of Eastern India, discusses the importance of preserving the culture and traditions of these interesting people.

The Living Soil. It is important that we realise that soil is a complex living system and not just so much dirt.

A Second Look at Lake Volta. The social and ecological side effects of building this vast man-made lake may easily counteract its much heralded benefits.

Reports by Alan Jones, L. B. Powell, Derrick Beecham.

Columns by Gulliver (ed. by Nicholas Gould), Edward Goldsmith, Lawrence Hills, Arthur Puffett.

Book Reviews, Letters, etc.

Poems

TRUANT DAYS

(for Hallam Tennyson)

Great days they were, those truant days
from school,
those Spring-proclaiming mornings when
my satchel
bulged not with books but cartridge paper,
paints,
a hunk of bread and cheese, maybe an
apple.

Great days, when school for me meant
water-meadows—
Dame Nature's hedgerow school for boys
who feel
her moods their own, and shun the class-
room window
from which the timid boys meek glances
steal.

I feel those days now in my blood as
Spring
comes round again to mark my thirty-fifth,
and dream those water-meadows and the
mill,
and wish I could go back to Spring, my
sixth:

Not for those truant days, but for what
school
could din, Spring in, Spring out into my
mind:
things must change, the march of human
progress
must be the only march of humankind.

For playing truant all my life from reason,
dawdling in the wake of life, alone

I find myself, with only my green pictures;
their inspiration, progress-damned, since
gone.

Oh had I been another stunted boy
set for the towering office blocks or banks;
subservient to all values not my own;
contented should I be now, in the ranks!

Mine might have been the Joy of serving
progress
planning the gasworks on those meadows;
the sewage
flow into the river by the mill
that stares now gristless on this dreamless
age—

But no; like the lost conscience of my
fellows
who have forgot the sun and Nature's
might,
and truant boys who love the green of
things,
and shall, in time, pull cities down for
light.

I gaze upon my pictures of the water-
meadows
of my Great truant days that were not
wasted
if pictures serve those future truant boys
bent on recalling Beauty from the dead.

Roger Frith '71

SPRAYING TIME

(In Memoriam A.F. & others)

Again it is spraying time
and I think of him now
as over Old Adam's Orchards
wafts sulphuric lime:

For in spraying time he died,
having lingered since Ypres,
of what wafted him there:
dichlorothyl sulphide.

Roger Frith '71

BLOOD RUST

When the bloom of spring is gone
When the three-toned siren sweeps air
over red sea
cut with rusting iron ribs that were land
life was over and nothing grew
All was rust, red arid and cutting to the
touch.

What was it that was life's pride beginning
and fruit
when the leaf burst and the ice was
broken?

Who knew such red that was not blood?
But no; no blood, no blood in this land
where the setting sun has no horizon under
which to dip.
No darkness.
Blazing red and rust in ribs and sea that
saw life's end.

What is now land and what is sea where
neither stops in orb?
This is still a dirty place where we once
were
where we polluted everything and at last
ourselves.

We cannot mourn though we would
We cannot undo what we did
Nor could we before the end
Caught in a cyclic trap.

Triple-toned siren sweeping the air
sounding death's triumph and life's end.

Peter Ohlson

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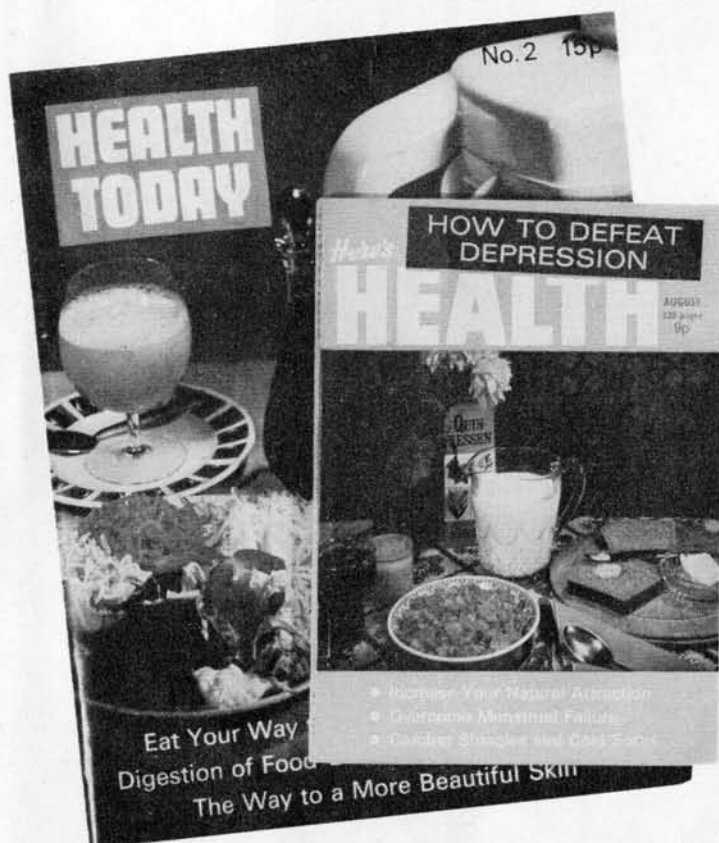
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