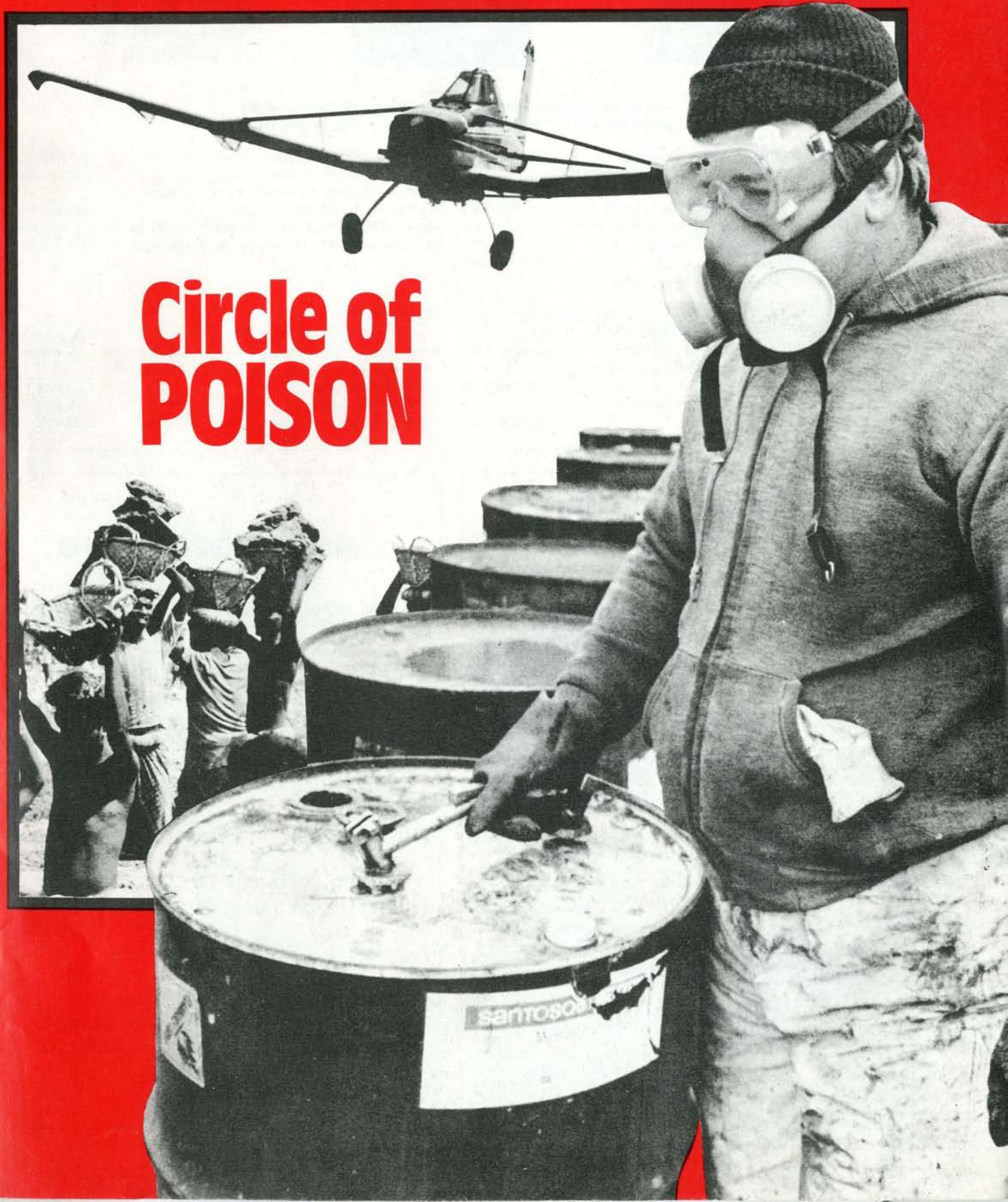


# The Ecologist

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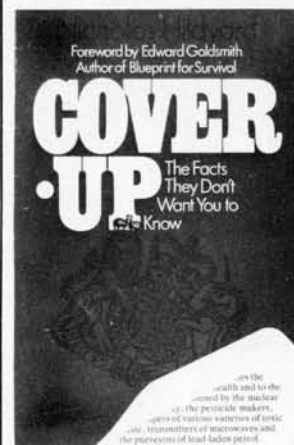
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Note: While every care is taken with manuscripts submitted for publication, the Editors cannot guarantee to return those not accepted. Articles published in the Ecologist do not necessarily express the views of the Editors.

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## The Ecologist Needs Your Help

Next month sees the eleventh birthday of *The Ecologist*. During those past eleven years, we have tried to make the magazine self-financing, and have nearly (though not quite) succeeded. To date our official losses amount to some £50,000 or about £5,000 a year — a figure which is small by the standards of similar magazines.

If we have kept our losses that low it is largely because some of us have worked without drawing any pay whatsoever (Edward Goldsmith for instance); others have contented themselves with a relatively low salary; and because our present and past managing editors have worked assiduously to keep costs to a minimum. Apart from small initial contributions from friends and relatives of our publisher at the launch of *The Ecologist* (sums which were eaten up in the first few months of publication), the magazine has never received any outside subsidy. Indeed our losses have been shouldered in their entirety by our publisher.

We believe that over the last decade, *The Ecologist* has played an important role in furthering the ideas of the ecological movement, not least among our successes has been the publication of *A Blueprint for Survival*, now published in sixteen languages, which spawned numerous 'green' political parties around the world, most notably in New Zealand and Great Britain. Six months after producing *A Blueprint for Survival*, we brought out our special issue on the Stockholm Conference and, in addition, jointly published and financed with US Friends of the Earth *The Stockholm Conference Eco*, a daily paper produced for the benefits of delegates and a model for similar papers at subsequent conferences. Since then, we have published special issues, many of which have had considerable influence, on such varied topics as the ecological problems of India, Canada and the United States; the threat posed by tree diseases; a plan to save the world's tropical forests; and, most recently, the need to reforest Great Britain. Inevitably, these special issues (and the activities involved with them) have cost substantial sums of money — sums which we have rarely recouped from their sale. Nonetheless, we believe they have fulfilled a useful function and during the coming year, we intend to bring out at least three new special issues.

Now *The Ecologist* needs your help. Over the years, we have accumulated a £16,000 overdraft —

an overdraft which is costing us some £2,000 a year in interest alone. Although there is no question of us closing down, it would be difficult to deny that we are hampered by our present debts and prevented from spending the money we should like to on the magazine. Hence this present 'utility' issue which, as you may have noticed, has eight less pages than it should do.

If you consider *The Ecologist* worth helping, you can assist us in the following ways:

1. If you are an occasional subscriber, please take out a regular subscription.
2. If you already subscribe, please help us get more subscribers either by persuading the company or institution you work for or your friends to take out a subscription; or by letting us know the names of possible subscribers to whom we can send a complimentary issue and a subscription form; or by sending a friend a gift subscription.
3. Please complete your set of *The Ecologist* by buying back-numbers. We may not be optimistic about the future of the world but we have always been unduly optimistic about sales of *The Ecologist* and consequently we have a considerable stock of past issues, although a few numbers are now out of print. A set of *The Ecologist* (minus those issues which are now missing) with indexes and binders can be bought for £80.00.
4. Please try and persuade the company or institution you work for to place an advertisement with us. Our advertising rates are as follows: full page £150; half page £80; one-third page £50; quarter page £40; and one-sixth page £30. Inserts (not more than 10g) £12.00 per thousand.
5. Please purchase from us some of the books we have produced. We still have stocks of *A Blueprint for Survival* (First edition, hardback £4) and Edward Goldsmith's *Stable Society* (Hardback £3.80: paperback £2.60).
6. Finally, if you can afford it, please make a donation towards reducing the burden of *The Ecologist's* overdraft.

We would like to thank you in advance for your help and support.

The Editors



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# The Selling of Asbestos

by

**Barry I. Castleman and Manuel J. Vera Vera**

The health hazards of asbestos have been known for well over half a century — although assiduous efforts have been made to cover-up the dangers. But whilst the sale of asbestos products is coming under increasingly stringent control in the West, the Third World still provides the asbestos industry with a largely unregulated market. And the multinationals have exploited it ruthlessly. . .

As the first century of the modern asbestos industry drew to a close, the "magic mineral" was proclaimed the largest single cause of environmental human cancer in the United States. The Secretary of Health, Education, and Welfare announced in 1978 that for the remainder of this century and part of the next, 17 per cent of all U.S. cancer deaths (over 50,000 per year) would be attributable to asbestos.<sup>1</sup>

Despite the best efforts of U.S. health experts to predict the toll, there is still uncertainty about these figures. Both high-concentration exposure for brief periods (hours or days) and far lower exposure for long periods are associated with some as yet undetermined cancer risk<sup>2</sup>. Asbestos dust inhalation has been linked to increased risk of cancer of the lungs, esophagus, stomach, colon, rectum, kidneys, pleura, and peritoneum<sup>2,3</sup>. It has been the otherwise-rare occurrence of mesotheliomas of the pleura and peritoneum that has revealed the extent of the danger.

In shipyards and other places where asbestos products were extensively used, mesothelioma has occurred not only in all the trades that worked around the asbestos, but also among secretaries and psychologists. Neighbours of shipyards and factories have contracted mesothelioma from ambient air pollution. Family members of asbestos workers and general shipyard workers have developed mesothelioma; and although many with household-contact mesothelioma from the dust taken home on workers' clothes have chest X-ray abnormalities consistent with asbestos exposure, some do not<sup>4</sup>.

Physicians at Britain's Department of Employment reported a number of "non-occupational asbestos exposure histories obtained in cases of mesothelioma." Included among these were the following three cases.<sup>5</sup>:

<i>Duration of Exposure</i>	<i>Nature of Exposure</i>
Unknown	Lived in a house largely composed of asbestos-cement sheeting
4 years	Worked on and lived adjacent to chicken farm composed of asbestos-cement buildings
1 day	Sawed up asbestos-cement sheets to construct two sheds

It is, of course, impossible to know for certain whether these three individuals actually contracted mesothelioma from the above exposures. They may have had other unrecognized or forgotten asbestos exposures, and maybe one or two of these cancers were not even caused by asbestos. On the other hand, it is certainly consistent with what is known about the carcinogenicity of asbestos that such environmental exposures would entail a mesothelioma risk. Chrysotile asbestos air pollution has been detected during dry, windy weather, emanating from asbestos-cement roofing tiles.<sup>6</sup>

## Compensation Suits

The widespread public recognition of the threat of asbestos in the United States has had a number of favourable results. Workers and their unions have insisted that employers adhere to the workplace regulations, pay premium rates for this hazardous work, and stop using asbestos. Insurance carriers have raised their worker's compensation insurance rates for employers who continue to use asbestos and have all but ceased to insure U.S. manufacturers of asbestos products for product liability suits brought by injured consumers<sup>7</sup>. And the U.S. Government has been stimulated to continue efforts to reduce consumer and environmental exposure to asbestos<sup>8-16</sup>.

In the courts, several thousand victims of asbestosis and cancer have so far sued the industry for knowingly marketing deadly products while making no effort to inform product users of the time-bomb danger of breathing asbestos dust. These lawsuits, which grow more numerous each day, may eventually cost the Johns-Manville Corporation, Owens-Corning, Armstrong, and a dozen other manufacturers and their insurance carriers several billion dollars in damages. The litigation has uncovered proof that the industry was not only well aware of the developing medical literature on asbestos, but also, the industry was actively tampering with the "scientific" reports of studies it supported as long ago as 1934 and suppressing reports of other studies it supported through the 1940s and 50s<sup>17, 18</sup>, (See Box).



One sequel to these revelations and others linking industrial suppression of internal knowledge to the deaths of employees and others has been a move in the U.S. Congress to declare such acts federal crimes. A bill introduced by Congressman George Miller and 40 co-sponsors would confront corporate executives who suppress deadly dangers from their employees and customers with the penalty of a minimum two-year jail term.

Though asbestos continues to be used in the United States in many hazardous and unnecessary applications, the combined pressures on the industry have resulted in a decline in total consumption since the peak year of 1974. However, asbestos use is soaring in many other parts of the world, and there is good reason to fear that the tragedies already recorded in scientific literature are being ignored — and repeated — today.

Previously it has been shown that asbestos textile producers were manufacturing in developing countries and supplying U.S. markets; this practice increased throughout the 1970s. Employees in two Mexican border towns of the U.S. firm, Amatex, first learned about the hazards of asbestos from news accounts, not from their employer<sup>19</sup>. Extremely hazardous conditions have also been described in the oldest asbestos-cement plant in Mexico, which produces water storage tanks for homes in Mexico City<sup>20</sup>.

#### Industry's View: Keep the Public in the Dark

Before getting into a detailed case study of the asbestos-cement products, it is appropriate to consider the broad-based attitudes of the asbestos industry. The industry's marketing approach unquestionably has the potential to limit vastly the extent of the public hazard involved in the manufacture, fabrication, and use of its products.

Of fundamental importance is the issue of notifying those who will work around asbestos of its lethal potential. Not only should workers be apprised of this, but they should also be instructed in detail about the use of available engineering controls (e.g. enclosure, ventilation), housekeeping practices (e.g. wet mopping instead of dry sweeping of debris), and the use and maintenance of respiratory protection that can limit their exposure to asbestos dust. The most basic, minimal means of notifying people that a product is dangerous is through the use of a warning label. Courts in the United States (where at least some asbestos products bore warning labels starting in 1964) have affirmed that the label should be comprehensible, prominently displayed, and not couched in misleadingly mild terms.

The international asbestos industry's own view of its responsibility to label its products as potentially lethal was recently revealed by the disclosure of an internal memorandum of the Asbestos International Association dated July 7, 1978<sup>21</sup>. The industry members generally agreed that it would be best to get by with as little warning labeling as their various markets would bear:

Most participants were in favour of an action in various stages, the switching over from one stage to



a further less favourable one, depending on outside pressure.

The British asbestos industry's approach to the labeling problem was regarded by many observers as worthy of imitation. This is because the British firms have been able to get their government off their backs with a warning label that reads, "Take care with asbestos." The memorandum goes on to note:

Many of the participants were of the opinion that it was advisable to adopt the U.K. label as such if the use of a label was unavoidable. Rediscussing the wording could bring along the risk of having to include the word "cancer" in it. The fact that this label had been found satisfactory to the U.K. authorities was also seen as a good argument for avoiding the EEC (European Economic Community) to press for a less favourable one (such as the skull-and-crossbones used for "toxic substances"). (Emphasis added)

The industry appeared unanimous, however, in the view that the best warning label is none at all:

In those countries where it was felt still too early to start voluntary labeling, in fear of a negative influence on sales, steps should be taken in order to prepare commercial people for the idea, making clear that in the absence of an industry's initiative we could run the risk of being imposed the "skull-and-crossbones" symbol for our products. It should also be pointed out to them that the fact to agree on a kind of label did not imply the agreement of starting to use it right now. (Emphasis added)

# The fifty-year Cover-Up

Under American law, before a case comes to court the parties in a lawsuit are permitted a discovery period during which they are expected to collect evidence to support their case: sworn 'depositions' are taken from key witnesses and relevant documents are obtained if necessary by subpoena. It was during such a discovery period that Karl Asch, a lawyer representing victims of asbestosis and cancer, came across an extraordinary cache of letters. He was investigating a compensation claim on behalf of an asbestos insulation worker who had developed lung cancer. As part of that investigation, Asch spent three days questioning the president of Raybestos-Manhattan, the company being sued and one of the largest manufacturers of asbestos products in the United States. During the interview, he noticed a dusty cardboard box on a shelf in a cupboard. When he asked what the box contained, he was told that it was full of old company files. Asch rummaged through them and was astonished by what he found. Dubbed the 'Asbestos Pentagon Papers' by the press, the files revealed a concerted and deliberate attempt by the asbestos industry to suppress any research that might dent its sales and undermine its official position that asbestos manufacturers could not be held liable for asbestos-related disease among those using their products.

It was not until 1964 — after Professor Irving Selikoff of Mount Sinai Medical School, New York, published a study showing that asbestos insulation workers had a 100 per cent higher chance of dying from lung disease than the average white male — that the US asbestos industry reluctantly began to place warning labels on its products. Until Selikoff's study, the asbestos manufacturers maintained that there was insufficient evidence to justify a warning label and that, being unaware of the health hazard, they could not be held liable for injuries to those who had used their products prior to that date. The letters found by Asch in Raybestos-Manhattan's head office exploded that defence once and for all. Indeed, when they were shown to South Carolina circuit judge, James Price, he was so shocked by what he termed 'this pattern of denial and attempts at suppression of information' that he ordered a retrial of a compensation case on a dead insulation worker.

In 1929, Dr Anthony Lanza of the Metropolitan Life Insurance Company was commissioned to undertake a survey of the health of randomly selected asbestos workers with more than three years of employment. The study, which showed that 53 per cent of the workers had asbestosis, was completed in 1931, but was not published until 1935. Before publication, Lanza dutifully sent galley proofs to Johns-Manville, the world's largest asbestos producer, and Raybestos-Manhattan, both of whom had sponsored his research. The galleys was forwarded to Johns-Manville's lawyer, George Hobart, who noted that several of Lanza's comments might effectively undermine the company's principal defence in any future

negligence suits — namely that too little was known about asbestosis to hold the owners of asbestos plants responsible for failing to take proper precautions to protect their workers from the disease. Hobart was particularly concerned about one sentence in the report which likened asbestosis to silicosis, a lung disease caused by inhaling silica dust. His concern was understandable, for the State Legislature of New Jersey, where Johns-Manville had its main factory, was about to recognise silicosis as a compensable disease. Any acknowledgement by the industry that asbestosis was similar to silicosis could easily result in asbestosis also being recognised. 'It would be very helpful to have an official report to show that there is a substantial difference between asbestosis and silicosis, and, by the same token, it would be troublesome if an official report should appear from which the conclusion might be drawn that there is very little, if any, difference between the two diseases.' Hobart went on to endorse a suggestion by Johns-Manville's chief attorney, Vandiver Brown, that Lanza should reinsert a sentence he had deleted from his original report. The sentence read: 'Clinically, from this study, asbestosis appeared to be a type of disease milder than silicosis.'

Hobart's comments, together with several other suggestions for changes in the text of the report, were sent to Lanza by Vandiver Brown with a covering letter. 'I am sure you will understand fully that no one in our organisation is suggesting for a moment that you alter by one jot or tittle any scientific facts or inevitable conclusions revealed or justified by your preliminary survey,' he wrote. 'All we ask is that all of the favourable aspects of the survey be included and that none of the unfavourable be unintentionally pictured in darker tones than the circumstances justify. I feel confident that we can depend upon you and Dr McConnell to give us this "break", and mine and Mr Hobart's suggestions are presented in this spirit.' Apparently, Lanza felt able to play ball, for the final sentence Brown and Hobart had urged him to reinstate was included word for word in the final published text, as were other suggested changes. In any event, the study had its desired effect: asbestosis was not recognised as a compensable disease in New Jersey until 1945.

Not that Johns-Manville refused point-blank to compensate workers. Rather, the company did not want the settlements put on a statutory basis. Minutes of two meetings in 1933 reveal that the company's board voted to settle eleven asbestos cases, due to be heard in a New Jersey court, for \$30,000. The settlement, however, was conditional of a written assurance being obtained 'from the attorney for the various plaintiffs that he would not directly or indirectly participate in the bringing of new actions against the corporation'.

The letters found by Asch also include a revealing correspondence between the editor of the trade magazine, *Asbestos*, and Sumner Simpson, the president of Raybestos-Manhattan. Following a

The spread of asbestos-cement products is particularly worrisome in view of industry attitudes and the low initial cost of installing these products. Asarco, Incorporated, is a U.S.-based multinational corporation with asbestos mines in Quebec. The corporation's chief officers opened the 1978 Annual Report by proclaiming that "the outpouring of costly regulations issued in the name of health, safety and environment continues out of control . . ." The report continued:

For 1979, asbestos producers face regulatory uncertainties in a number of industrialized countries that could affect the market for both asbestos and manufactured products containing asbestos. However, demand from developing countries for asbestos-cement sheet, a cost-effective building material, remains strong.

## Asbestos Cement Products in USA

The incorporation of asbestos as a binder in cement products began in 1900 in Europe. Asbestos-cement sheet products are widely used today in building construction, as is asbestos-cement pipe in water and sewerage systems. In the United States, asbestos-

cement sheet and pipe accounted for 29,000 and 146,000 metric tons of asbestos fibre in 1978, respectively, for a total of 41 per cent of the nation's asbestos consumption<sup>22</sup>.

Hazardous exposures to asbestos commonly occur in the manufacture and fabrication of asbestos-cement sheet and pipe. Asbestos air and water pollution frequently results from the use, maintenance, and disposal of asbestos-cement products. Mixing the ingredients and sawing asbestos-cement products releases dense clouds of visible asbestos dust, with exposures as high as several hundred million asbestos fibres per cubic metre of air<sup>23, 24</sup>. Though portable, high velocity, local exhaust ventilation cutting machines are available for sawing asbestos-cement sheet, the use of such devices is not standard practice in the construction industry. Recently, construction workers in Utah developed obstructive respiratory impairment shortly after five months of sawing asbestos-cement panels inside a new building<sup>25</sup>. None of the deflection shrouds tested by industry in the United States for cutting asbestos-cement pipe are equipped with dust collection devices, though they do reduce operator



decision by the New York Legislature to make asbestosis compensable, the magazine wrote to the company asking for permission to publish an article on the disease and on modern methods of dust control. Even by the deferential standards of the 1930s, the phrasing of the request is remarkable:

'You may recall that we have written to you on several occasions concerning the publishing of information, or discussion of asbestosis and the work which has been done, or is being done, to eliminate or at least reduce it.

'Always you have requested that for certain obvious reasons we publish nothing, and naturally your wishes have been respected.

'Possibly by this time, however, the reasons for your objection to publicity on this subject have been eliminated, and if so, we would very much like to review the whole matter in *Asbestos* . . .

'We await with much interest your reply. If there is no serious objection it would seem to be a most interesting subject for the pages of *Asbestos*, and possibly with a discussion of it in *Asbestos* along the right lines, would serve to combat some of the rather undesirable publicity given to it in current newspapers.'

Simpson sent the letter to Vandiver Brown, with the comment: 'As I see it personally, we would be just as well off to say nothing about it until our survey is complete. I think the less said about asbestos the better off we are, but at the same time, we cannot lose track of the fact that there have been a number of articles on asbestos dust controls and asbestosis in the British trade magazines. The magazine *Asbestos* is in the business to publish articles affecting the trade and they have been very decent about not reprinting the English articles.' Brown replied: 'I quite agree with you that our interests are best served by having asbestos receive a minimum of publicity.'

By 1936, with adverse reports of asbestosis stacking up, Simpson wrote to five other companies, suggesting they might like to participate in funding a study on the effects of asbestos on rats. Simpson made it quite clear that the research could do no harm as it would be totally under the companies' control. 'From time to time, after the findings are made we can determine whether we wish any publication or not,' he wrote. 'My own view is that it would be a good thing to distribute the information among the medical fraternity, providing it is of the right type and would not injure our companies.'

The research was duly funded and carried out at the Saranac Laboratories, New York, by Dr Leroy Gardner, whose contract stipulated that 'the results of these studies shall become the property of the (contributing companies) and the manuscripts of any reports shall be submitted for approval of the contributors before publication'. Although internal memoranda reveal that Gardner found a high incidence of lung cancer in mice exposed to long asbestos fibres, all mention of cancer was deleted in the summary reports sent by the laboratory to Johns-Manville.

Although the medical director of Johns-Manville, Dr Kenneth

Smith, knew from X-rays taken in 1948 that workers at one of the company's Canadian plants were suffering from asbestosis — but had not yet developed its crippling symptoms — he recommended that they should not be told of their illness. 'The fibrosis is irreversible and permanent so that eventually compensation will be paid to each of these men,' he wrote in a confidential memorandum. 'But as long as the man is not disabled it is felt that he should not be told of his condition so that he can live and work in peace and the company can benefit by his many years of experience. Should the man be told of his conditions there is a definite probability that he would become mentally and physically ill simply through the knowledge that he had asbestosis.' However, Smith did recommend that the company place warning labels on their products — a recommendation that was turned down. A Johns-Manville plant manager recently testified that the company had a policy of not informing workers if their medical check-ups showed signs of asbestosis right up until 1971.

In 1952, the Industrial Hygiene Foundation (described by Vandiver Brown as 'a creature of industry and an institution upon which employers can rely for a completely sympathetic approach to their viewpoint') proposed that the US Asbestos Textile Institute conduct a cancer survey among its workers. The proposal was rejected, after a similar study in Britain showed a high rate of lung cancer, for fear 'that such an investigation would stir up a hornets' nest and put the whole industry under suspicion'. Although a study was eventually undertaken, it was described by Dr Wilhelm Hueper, the founding father of the science of epidemiology, as 'statistical acrobatics which tend to obscure incriminating evidence'.

Two years before Selikoff produced his study of New York insulation workers, the Philip-Carey Manufacturing Company hired Dr Thomas Mancuso to conduct a study of the health of workers in one of its factories. It was hoped that 'from the claims standpoint, Dr Mancuso, as a nationally credited expert, can help to differentiate an expensive asbestosis or silicosis case from non-occupational illnesses such as cancer or bronchitis, and make the defence stand up'. The company had evidently misjudged Mancuso, a man of the highest integrity, who was not going to tailor his conclusions simply because the company was paying for his services. After finding an excess rate of cancer, he published the results in 1963 and, in a confidential report, urged the company to clean up their plant and warn consumers of the dangers asbestos posed to their health. Philip-Carey, now taken over by Celotex, did not do so until 1971. Instead, Mancuso told me that they deny receiving his recommended safety improvements.

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exposures<sup>26</sup>.

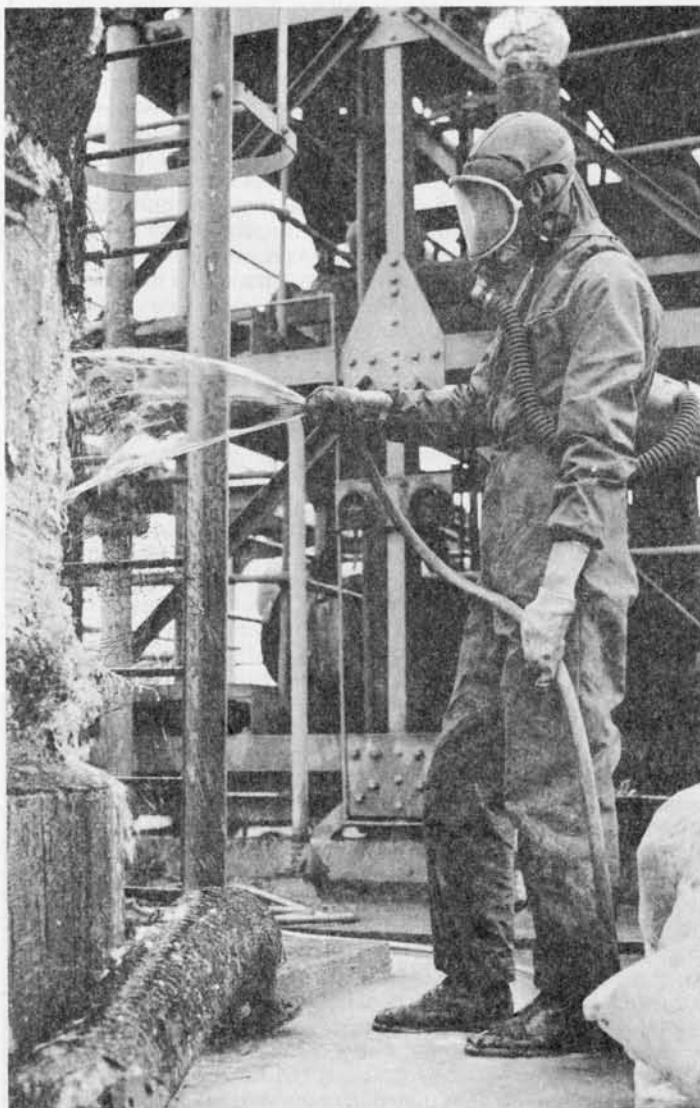
Drinking water is widely contaminated by asbestos from conduits and asbestos tile roofing. With asbestos-cement pipes, the water conditions favouring leaching of fibre from pipe walls are acidity (low pH) and low calcium saturation. Drilling and cutting for installation and maintenance pose additional contamination threats. Cisterns in St. Croix, U.S. Virgin Islands, which collect drinking water from asbestos tile roofing material, have been shown to have contamination levels of over 500 million fibres per litre. High fibre concentrations have also been reported in cisterns in Ohio and Kentucky by the U.S. Environmental Protection Agency.<sup>27, 28</sup>

### Asbestos Housing in Puerto Rico

Around 1973, the government of Puerto Rico was looking for safe, sturdy, and resistant materials which could be used in developing housing alternatives for the poor people of the island. It was accepted that the construction of houses using wood and zinc roofing was inappropriate, due to the climatological conditions on this tropical island. At the time, asbestos-cement

looked like the answer. Over 500 asbestos-cement schools had been built in the late 1950s and early 60s. So beginning in 1975, nearly 2,000 houses of asbestos-cement were built throughout the island by the Housing Department. The houses were bought from Eternit Pacifico, S.A., a Colombian manufacturer, and delivered to Puerto Rico for assembly. This company is a subsidiary of the large European Eternit multinational. The original government investment was supposed to be around \$6 million, but as a result of some problems with shipping and delivery, it was closer to \$11 million. In the summer of 1978, the construction and sale of the houses was stopped because of public outcry against the asbestos and its health hazard. Meanwhile, the asbestos-cement classrooms continue to be used by nearly 50,000 children.

Servicios Legales de Puerto Rico, Inc. had been working with one of the asbestos-cement communities in San Sebastian, a small town in western Puerto Rico, since 1977. The community's concern at that time was the physical condition of the houses. They were plagued by defects such as broken and cracked asbestos-cement roofing, wall panels, and ceiling



panels and malfunctioning electrical systems and plumbing. The floors were unlevelled, and moisture would collect on them during rainy days.

Except for the concrete floors, the houses in this community (as in the others in Puerto Rico) were totally built of asbestos-cement. Since the majority of the floors were unlevelled, the asbestos-cement panels were forced into place and secured by the use of bolts and nuts. The result of this construction method was that soon after the houses were built, the upper corners of the asbestos sheets cracked under the stress on the materials. At the same time, the lateral panels (inside and outside) started to crack under the pressure created by the unlevelled floors and by the blows of children playing and other normal living conditions.

In most of the houses, the wind blowing through the ceiling space between the corrugated roofing and the layer of ceiling panels below jostled the ceiling panels, even breaking some of them, leaving the corrugated asbestos roofing exposed in the inside of the home. There was considerable dust caused by wind shaking the ceiling panels. Some of the residents replaced the asbestos-cement with decorative wood panels.

Another major construction problem of the houses was that most of their plumbing was deficient and inadequate to sustain the water pressure. As a result, the lines broke in the bathrooms and the kitchens. The residents were then forced to break the asbestos sheets, using hammers and saws to expose the

plumbing. There was no other way to get to it, since the plumbing was sealed behind the asbestos-cement sheets.

Some residents made major renovations, e.g. knocking out an archway in a wall. They had not been warned that the dust was a mortal danger. In one home where the infants had developed breathing difficulties, an archway stood with threads of asbestos hanging along the cut edges of the asbestos-cement wall panels.

After a year of vain efforts with the Housing Department, *Servicios Legales*, representing 27 families, filed a suit in July 1978 against the Housing Department claiming for damages resulting from the construction defects and for breach of contract. At that time, *Servicios Legales* and its clients were totally unaware of the health hazards of asbestos. That was the reason for claiming damages only for the construction defects.

Around September 1978, the U.S. Social Security Administration circulated among the Social Security beneficiaries in the community a publication of the U.S. Department of Health, Education, and Welfare related to asbestos and asbestos exposure. It was then that the members of the community asked for information about possible health problems in their homes. At this point, *Servicios Legales* started a complete investigation of the subject and, after analysis and consultation, amended the suit in December 1978 to include the health issue and the implicit warranty of habitability.

### Denial of Dangers

The main legal problem then, and now, was that the Colombian manufacturer and its parent European multinational, Eternit, which sold the asbestos houses to the government of Puerto Rico, were out of the residents' reach for a legal claim. The company, which had made millions of dollars and was responsible for the importation to Puerto Rico of the asbestos housing, could not be made legally responsible for the health harm that the product caused in Puerto Rico. (There appear to be no specific regulations for workplace exposure to asbestos and asbestos pollution in Colombia, which is another aspect of the overall problem.)

The only alternative available to the residents was to file suit against the government, which had sold them the houses after assembly in Puerto Rico. Since then, the government has denied that the asbestos schools or houses are dangerous. But in the summer of 1978, after a study was issued by Dr. William Nicholson of the Mount Sinai School of Medicine, New York, on the asbestos concentrations in schools and houses, the government decided to discontinue the use of the schools and start a replacement programme under the excuse that the facilities were old and obsolete. The authorities also discontinued the construction and sale of the houses because they were "structurally unfit and dangerous."

This study by Dr. Nicholson was prepared under a contract with the Consumer Product Safety Commission following a request in June 1977 for a survey and air samples of the asbestos-cement schools and



# Asbestos Fall-Out at Johns-Manville

Official estimates in the United States put the potential death toll from asbestos exposure amongst workers alone at two million. In Britain, it is possible that some 500,000 workers will die from asbestos-related diseases over the next thirty years. If that proves the case then, as Alan Dalton of the British Society for Social Responsibility in Science remarks: "Asbestos exposure will kill more people in Britain than were killed in the armed forces during the Second World War."

Faced with a sky-rocketing bill for compensation claims, the US asbestos industry is now fighting a last ditch battle to survive — and none more so than Johns-Manville, the world's largest producer of asbestos outside the Soviet Union and a company with annual sales of some two billion dollars. "John McKinney, the chairman of Johns-Manville, is coping with an avalanche of litigation from workers who were exposed to his company's products," reports Stephen Solomon in the prestigious *Fortune* magazine. "He spends half of his time on the asbestos problem, directing the company's strategy and meeting with legislators and security analysts. The company has had trouble both on Capitol Hill and on Wall Street. During a series of Congressional hearings on asbestos (in Autumn 1978) the price of Johns-Manville stocks plunged about 20 per cent."

To make matters worse, Johns-Manville has now been abandoned by its insurance brokers, Travellers Corporation, which in 1977 declined to renew the company's policy against compensation claims. Forced to draw on its own resources, Johns-Manville turned to its friends on Capitol Hill. In 1979, Representative Millicent Fenwick, a Republican from New Jersey where Johns-Manville has its largest plant, introduced a bill which if passed would have made the federal government responsible for paying some of the damages for asbestos-related diseases. The bill was drafted by Johns-Manville.

Recently, Johns-Manville have taken a more aggressive tack

towards its detractors. In 1980, with more than 3000 compensation claims pending against the company, John McKinney accused those lawyers who have filed suits of 'ambulance chasing' and castigated environmentalists and others concerned about the dangers of asbestos as "charlatans and pipsqueaks".

"They have to go up (to the Capitol) for their budgets and show they've slain some dragons," he told *The Wall Street Journal*. "If you carry this to the extreme — and that's what the government idiots are doing — no industry is immune." McKinney reserves his most stringent criticisms for those scientists at the US National Institute of Occupational Safety and Health who wish to reduce the asbestos exposure standard for workers from two fibres per cubic centimetre of air to one fibre per cubic centimetre. "Those charlatans at NIOSH," says McKinney, "are implying that there is no safe level but that's just nonsense for headline-getting purposes."

In fact, NIOSH has expressed a wish to reduce exposure standards even further — to 0.1 fibres per cubic centimetre. A major problem is that conventional monitoring techniques can only detect asbestos fibres over 5 microns in length. Yet electron microscopes reveal that for every long fibre detected, hundreds of smaller ones go uncounted. From then on arithmetic takes over: a man, inhaling an estimated 8 cubic metres of air in an average working day, will be seen to be breathing in only 16 million fibres — assuming that dust levels are kept within the 2 fibre limit. In fact, as Professor Samuel Epstein points out, he may be inhaling as many as 1.6 billion short fibres. Moreover, laboratory studies reveal that it is those fine undetected asbestos fibres which pose the greatest danger to human health. Even at 250,000 fibres per cubic metre, NIOSH has discovered that workers suffer twice the expected rate of asbestosis and lung cancer.

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housing by Rafael Ramos Lacen, a Puerto Rican industrial consultant<sup>29, 30</sup>. The findings were highly "criticized" by the asbestos manufacturers in and out of Puerto Rico, and additional air samples were taken to add to the data base. The results of that second sampling have not yet been reported.

In his analysis of the initial house samples, Dr. Nicholson found:

... air concentrations somewhat higher than those normally encountered in urban settings ... (T)he possibility exists that a contribution to asbestos levels may result from the erosion and washing of fibres from the roof and concomitant dissemination into the air ...

His findings in the schools were more illustrative of the extent of the asbestos contamination:

Uniformly high air concentrations of asbestos were seen in seven samples taken in or about schools constructed of asbestos-cement panels, including one (4,500 ng/m<sup>3</sup>) of a degree rarely seen in environmental circumstances, even near known asbestos sources.

The report contained one photograph of elementary school children napping on an asbestos-cement school-room floor.

## Acknowledgement of Cancer

Following the Nicholson study and the filing of the amended claim in the Superior Court, the local press started an investigation of the issues, and the problem was given wide coverage in the media. The asbestos communities in Puerto Rico were represented in two press conferences calling for the attention of the Governor, the Housing Department Secretary, and the Legislature. Servicios Legales started a campaign to

locate all the asbestos-cement communities and schools in Puerto Rico and to start a census on the construction and health problems that had already started to appear (e.g. respiratory problems, allergies, rashes, and a peculiar type of skin ulcer on the lower limbs, mainly of children).

The official position of the government at first was that Nicholson's study did not find any abnormal concentrations of asbestos in the houses' air samples and that it was only a political issue since there was no scientific evidence relating low levels of airborne asbestos to any health problems. For this reason, no public warnings or instructions were given as to the need for great care in repairing or renovating the asbestos houses.

The issue was finally taken up by the government, and three legislative measures were submitted for the substitution of the asbestos houses and schools. Most significant was House Bill No. 2654, which pointed out in its Exposition of Motives that not only had studies made by the Housing Department found the houses to be unsafe and vulnerable structurally, but also — and even more alarming — scientific studies showed that asbestos was highly associated with cancer.

This was the most unambiguous acknowledgment by the Puerto Rican government of the health risks of asbestos in the schools and houses. At legislative hearings in March 1979, Servicios Legales de Puerto Rico presented a scientific analysis of the asbestos issue. Servicios Legales also criticized Bill 2654, because even though it considered the health issue, its wording tended to encourage the home owners to do their own repairs and renovations, failing to provide any warnings to the public about ways to handle and dispose of asbestos materials in compliance with the standards of the U.S. Occupational Safety and Health



Child playing on asbestos dump outside Hindustan Ferodo Ltd's asbestos plant in Bombay, India. According to a former employee of the firm, conditions at the plant leave much to be desired (see interview opposite). Most of the products manufactured by Hindustan Ferodo are consumed in India — although 5-10 per cent are exported, with the major destinations being Sri Lanka and South Asia.



Kamal Graphics

Administration (OSHA) and the Environmental Protection Agency (EPA). Bill 2654 suffered some amendments, including the elimination of the reference to cancer, which was requested by the Justice Department because of "its possible legal repercussions" in the future, and ultimately was substituted by Bill 1109. Bill 1109 was finally approved as Law No. 125 in July 1979, and \$16.4 million was provided for the substitution of the asbestos houses in a two-year plan.

Before the law was approved, the Superior Court of Puerto Rico certified the residents' suit as a class action. This decision was appealed by the Housing Department, the defendant in the case. The apparent intention of this is to delay the court action until the houses are substituted and to let the issue subside. In the meanwhile, the National Association of Asbestos House Owners, established in the summer of 1979 with representation of the majority of the asbestos-cement house communities on the island, is active in the supervision of all contracts, rules, and regulations under which the houses are to be substituted, especially the ways in which the Housing Department contractors are going to dispose of the asbestos-cement materials in compliance with EPA and OSHA regulations, practically unknown in Puerto Rico.

It has been three years since the San Sebastian community first made its complaints to the Housing Department because of the construction defects, and over one year since the issue went to court. Only \$16.4 million has been provided to replace nearly 1,391 houses and relocate over 5,000 human beings in a slow

and bureaucratic process. Many of the asbestos-cement schools are still in use. The resulting chronic health effects are impossible to predict or prevent.

### Substitutes are Available

Corrugated and flat fibre-cement roofing can be made without asbestos. The fibre can be something that is locally available, e.g. human hair cuttings, common grasses, crop wastes from bananas or coconuts. The roofing panels made with these harmless fibres cost one-third as much as asbestos-cement sheets, can be made in 20 minutes, and require no special equipment or skill to manufacture<sup>31</sup>. Another product that shows promise as a substitute for asbestos-cement is glass-reinforced, stabilized clay. A full and competent evaluation of available substitutes would certainly be of value at this time.

The Economic and Social Committee of the European Economic Community considered the problems of asbestos and made a number of recommendations early in 1979. Among these was a ban on asbestos "in manufacturing processes where substitutes are available which do not have the hazardous properties of asbestos"; and "where liquids are processed for human consumption."<sup>32</sup>

Sweden has banned the manufacture of asbestos-cement, mainly because of occupational hazards, and imports of asbestos fibre have declined from 20,000 tons per year to only a few thousand tons per year<sup>33</sup>.

U.S. Environmental Protection Agency researchers have finally concluded that asbestos contamination of



## Interview with a former employee of Hindustan Ferodo, Ltd.

Hindustan Ferodo, Ltd. manufactures a number of asbestos products at its factory in Bombay, India. The plant was built in 1956. Turner and Newall Ltd. of Manchester, England — the largest asbestos enterprise in Western Europe — owns 74 per cent of the share capital of Hindustan Ferodo. The interview which follows, conducted in March 1980, describes working conditions and business practices in the Bombay plant.

**Q:** *Are the products labeled as to possible health hazards?*

**A:** There's no indication on any product that it may be hazardous to health.

**Q:** *I've been told that the products must be shipped in unmarked containers, as there have been problems unloading these shipments in the West. Is this true?*

**A:** It is true that the company has been having problems, particularly with webbing and friction materials sent to the U.K., where there are very stringent packaging requirements. The products must be triple-packed in polyethylene so that there will be no leaks due to container damage during shipment. They weren't packaging it this well, and as a result several consignments were returned. They stopped exporting to the U.K. two or three months ago, for this reason (it increases the cost), and because they have such a domestic demand that they don't need to export to the United Kingdom. They haven't had any such problems in Southeast Asia and Sri Lanka, so they're not triple-packaging any shipments to those areas.

**Q:** *Are the workers informed of the nature of the hazard and, if so, are they told of preventive measures?*

**A:** No, they're not told at all. Virtually no one is told, in fact. Not only are the workers not told, but even management personnel are not informed about any workplace hazard. Ventilation systems are poorly maintained. Dust on the floors is just swept up dry with a broom, instead of a wet mop. The workers even have the idea, which management does nothing to dispel, that if you drink alcoholic drinks, the asbestos won't do you any harm. A lot of the workers are heavy drinkers.

**Q:** *Are there workplace standards for asbestos fibres? If so, what are they and what is the penalty for non-compliance? Are the workplaces monitored regularly and how?*

**A:** (He has no idea what standards there are or what the penalty is for non-compliance.) They do take dust counts on a relatively regular basis. The dust levels in many spots in the factory are easily visible, with much dust in the air in some of the operations. Hence, although there is some air monitoring, there appear to be no hygiene standards maintained.

**Q:** *What protection is given to the workers?*

**A:** The workers are given uniforms, which they leave at the shop and which are laundered every two or three days. The same locker is used for work clothes and street clothes, however. The fluffing and the carding operations are the most dusty. It's very visible, as dense as the dust in the air behind a bus on a dirt road in dry season. These areas are enclosed, and workers are supposed to wear

respirators of the cannister type. However, they generally avoid this, because they're not given any indication that this dust is extremely hazardous. As far as they know, it's just very unpleasant to breathe because it's so thick. So the workers often avoid the respirators because of the discomfort of wearing the face masks for hours. It's only in these two operations, the fluffing and carding, that cannister-type respirators are provided. The rest of the workers in the plant are given cloths that resemble surgical masks — a piece of cloth tied around the head with strings, except for top management officials who wear them every time they go into the work area, few employees use these devices. Generally, unless the dust is really a nuisance, clogging up the nose and so forth, no face mask is worn. There are no notices anywhere in the plant warning against the dangers of excessive dust inhalation.

There is also a sort of hazard pay scheme in effect. Workers in the fluffing operation and in the carding operation get a 5 percent "inconvenience allowance" (this has been in effect for the last two years). It's called an "inconvenience allowance" because they have to put up with the inconvenience of wearing respirators.

**Q:** *What is the medical monitoring program and when was it implemented?*

**A:** They've had medical monitoring since around 1970. Once or twice a year each production worker is screened. There is no screening for office personnel, and no one in the office is ever told anything about what the screening is for. Workers are simply taken off the job for a couple of hours, put in the company van and driven up to the medical building, given an X-ray and sent back. *The workers are not told of the results.* They just view it as a way of getting out of a couple of hours work. The workers know nothing about the medical records kept by the company.

**Q:** *How is asbestos dust generated, captured, and ultimately disposed of?*

**A:** The plant is a fairly dusty place. Asbestos is received in polyethylene bags, which are cut open with a knife. The sack cutters do not wear dust respirators, though some wear the useless cloth masks. Workers slice the bags open, then they flip them over and empty them. The asbestos comes out like a block, and is tossed onto a conveyor belt which goes a short distance to the machinery. Overwhelmed exhaust ventilation is used in some dusty areas. All the suction ducts lead into a room outside of the plant. This equipment is designed to pack and seal the dust in polyethylene bags; unfortunately, jute bags are used instead, which leak dust profusely. The area is like a dust storm. "Outside" contract laborers are used in this area, and they are given no respiratory protection, no uniforms, no medical check-ups. They are completely covered in dust and look like they work in a flour mill, white from head to toe. The sacks of short-fiber waste dust are taken out by truck and just dumped nearby beside a small stream. In the last couple of months, the municipal council has objected to the dumping, and consequently big piles of pure asbestos wastes are accumulating in the factory yard.

**Q:** *Are there ever visitors at the plant, who observe typical operation?*

**A:** When visitors are expected, extra cleaning workers are hired, and the dustier operations are shut down for a while to clean up the plant.

water supplies from asbestos-cement pipe constitutes a carcinogenic hazard to the public<sup>27</sup>. In Seattle, Washington, where the water supply is aggressive and quite capable of entraining asbestos from the walls of asbestos-cement conduits, local authorities have moved to ban further installations of such pipe for water supplies<sup>28</sup>. There has also been considerable controversy over the use of asbestos-cement water pipe in Virginia; the city of Chesapeake has halted its use, following City Council hearings on the subject in which citizens, industry, and an environmental group participated.

In light of available information, the use of asbestos-cement in the construction industry worldwide ought to be drastically curtailed, if not altogether eliminated.

### Substitution of other Asbestos Products

Recent advances elsewhere in the commercial substitution of asbestos warrant mention here.

By far the largest toll of asbestos disease is attributable to one class of products: insulation. Although only a small fraction of shipyard and construction workers actually installed asbestos-containing pipe and boiler insulation, the dust created exposed millions of workers in other trades to severe hazards of cancer and asbestosis. The spraying of asbestos in British naval ships, which started in 1944, was abandoned in 1963<sup>34</sup>. The use of sprayed and molded asbestos insulation in the United States continued into the 1970s. Following state and local action, in 1973 the U.S. Environmental Protection Agency issued rules to curtail the use of sprayed asbestos, and in 1975 banned the use of asbestos in molded pipe insulation<sup>11</sup>. Safer substitutes had long been available<sup>35, 36</sup>.

Despite the fact that the epidemic of disease caused by asbestos insulation has been thoroughly documented world-wide, the Novex Foreign Trade Company of Hungary announced in 1977 that it was going to market an asbestos-containing material for use in spray, molded, and sheet form<sup>37</sup>. This material, Asket, vividly illustrates how a marginal byproduct (short-fibre asbestos) can be converted into a major cancer hazard. The continuing use of asbestos insulation in ships today assures the needless perpetuation of the threat of asbestos disease to ship repair workers all over the world beyond the year 2000.

One of the most prominent uses of asbestos today is in automotive friction products: brakes and clutch facings. On September 7, 1979, General Motors announced to the EPA that approximately 60 per cent of all passenger car disc brakes manufactured and used by GM had non-asbestos friction materials. It was projected that all GM 1983-model passenger cars with disc brakes would have asbestos-free brakes, and all cars with drum brakes and light trucks would have asbestos-free brakes by the 1985 model year<sup>38</sup>.

The largest U.S. manufacturer of friction materials, Raybestos-Manhattan Corporation, already faces product liability suits brought by brake mechanics for failure to warn of asbestos dangers in the past. In its 1978 Annual Report, this firm announced: "We are planning to eliminate asbestos from our friction materials by 1982 in order to minimize the effect of any further government regulations in this area." One would presume from a liability standpoint alone that the substitutes must entail substantially less health hazard than the old asbestos formulations.

The friction products industry was described in a 1976 industry report as the employer of nearly 20 per cent of the asbestos plant workers in the United States, the largest employer of nine primary asbestos industries with a work force of 7,304 employees<sup>39</sup>. In addition, an estimated 900,000 auto mechanics and garage workers are deemed "potentially exposed to asbestos" in the servicing of brakes and clutches, according to a warning circulated by the National Institute for Occupational Safety and Health<sup>40</sup>. Thousands more are exposed occupationally in mining, milling, and transporting 80,000 metric tons of asbestos a year for the U.S. friction products industry<sup>22</sup>. The rest of us are exposed to asbestos air and water pollution from all the mining, milling, manufacturing, brake repair, and brake decomposition in both remote regions and towns. Brake linings have been an asbestos industry advertising symbol of life-saving value based on irreplaceability.

It is thus a matter of tremendous significance that friction products are ready to join pipe insulation and others as asbestos-free industries in the 1980s, not only in the United States but worldwide. Whether this life-saving advance will take place, however, remains to be seen.

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# The Circle of Poison

Every minute of the day, one person in the Third World is poisoned by pesticides — and one dies every hour and three-quarters. Many of those deaths are caused by pesticides banned in the United States but, nonetheless, freely exported by Western companies to undeveloped countries. **David Weir and Mark Schapiro** investigate the marketing of banned pesticides and the consequences — not least for Western consumers — of their widespread use in the Third World.

Once or twice every working day a sealed semi-trailer winds through a grimy industrial section of the Los Angeles basin called City of Commerce. The truck moves slowly up Pacific Street past a row of dingy warehouses to a loading dock at the rear of Amvac Chemical Corporation's pesticide plant. There, from a storage area labeled "Restricted Area/Authorized personnel only beyond this point," light blue, 30-gallon drums stacked three high are loaded into the semi-trailer.

When it's filled, the rig heads for one of the interstate highways crisscrossing the area, and moves into the stream of traffic flowing back and forth across the country. The driver carries emergency telephone numbers and special instructions in case the colorless, odorless fluid in the drums somehow spills or is released. No unloading or transfer of the toxic cargo is permitted en route to the shipping docks, where the chemical will be sent overseas.

The pesticide in the light blue drums is 1,2-Dibromo-3-chloropropane, or DBCP. DBCP is a nematocide, effective against the small worms called nematodes which attack food plants such as pineapples, bananas and citrus fruits. Its destination is either Hawaii or the underdeveloped countries of the third world, because in 1979, the U.S. Environmental Protection Agency issued an emergency suspension of all uses of DBCP (except on Hawaiian pineapples) because DBCP is believed to cause cancer and make humans sterile.<sup>1</sup>

Until recently, many of the trucks carrying Amvac's DBCP were

bound for the Gulfport, Mississippi, loading docks of Standard Fruit & Steamship Company, a subsidiary of Castle & Cooke. At Gulfport, the light blue drums were loaded onto a "banana ship", destined for Puerto Limón in Costa Rica, La Ceiba in Honduras, or Guayaquil in Ecuador.

## DBCP bananas for U.S. tables

After four to seven days at sea, the banana ship docked and the pesticide drums were unloaded and taken to their ultimate stop — the vast banana and pineapple plantations of Castle & Cooke. Castle & Cooke is one of the largest foreign corporate landholders in Central America. Workers on the company plantations, mostly illiterate peasants, will use this pesticide to kill soil-dwelling worms that attack bananas. Then virtually all the bananas will be shipped to U.S. tables.

Castle & Cooke no longer imports DBCP from Amvac directly. After our article in the November 1979 issue of *Mother Jones* magazine exposed its DBCP use, Castle & Cooke found a more discreet method to acquire it.

"Castle & Cooke decided to stop importing DBCP from us directly," an Amvac marketing official explained recently. "Their policy is 'let's not cause any furor — we will get the stuff through local importers down there.' Now we have to contact the people who import it for them in Central America. Castle & Cooke won't buy it directly anymore, but they encourage their plantation managers to buy it from local importers down there."<sup>2</sup>

DBCP is used on bananas in

North Africa and on pineapples in Taiwan. And Amvac sells DBCP "anywhere in the world where bananas, pineapples, citrus, and cotton are grown — they're our big customers," according to its marketing official.<sup>3</sup> Amvac, a relatively small chemical supplier, maintains close contacts with the agribusiness giants which use its product — Castle & Cooke, Del Monte, and United Brands.

"There's no problem with the ban of DBCP (within the United States)," says the Amvac executive. "In fact, it was the best thing that could have happened for us. You can't sell it here anymore but you can still sell it anywhere else. Our big market has always been exports anyway."<sup>4</sup>

## Where giants fear to tread

Amvac is now the only company anywhere producing DBCP. When workers at Occidental's DBCP plant in California discovered in 1977 that many of them were sterile, the State of California banned the use of DBCP outright — an action which the federal Environmental Protection Agency waited two more years to take. Occidental, Dow and Shell quickly ceased their production. But little Amvac rushed in to seize the profit opportunities suddenly abandoned by the giants.

The company candidly explained its motives in its "10-K", an annual report required by the U.S. Securities and Exchange Commission: "Management believes that because of the extensive publicity and notoriety that has arisen over the sterility of workers and the suspected mutagenic and carcinogenic nature





of DBCP, the principal manufacturers and distributors of the product (Dow, Occidental, and Shell Chemical) have, temporarily at least, decided to remove themselves from the domestic market-place and possibly from the world market-place," the report states.

"Notwithstanding all the publicity and notoriety surrounding DBCP," Amvac's report continues, "It was (our) opinion that a vacuum existed in the marketplace that (we) could temporarily occupy . . . (we) further believed that with the addition of DBCP, sales might be sufficient to reach a profitable level."<sup>5</sup>

A former Amvac executive told us why company officials decided to produce DBCP. "They're not really for spreading cancer or 'no-population' growth (a reference to the chemical's sterility link). But DBCP is very important to them," he explained. "Quite frankly, without DBCP, Amvac would go bankrupt."<sup>6</sup>

Before moving into the DBCP business, Amvac was in bad shape. In late 1978, one of its two principal stockholders, MTM Enterprises (which is controlled by Mary Tyler

Moore and her husband, and which produces the popular television show *Lou Grant*), decided to divest itself of its 12 per cent portion of Amvac's common shares. Amvac faced imminent collapse until its major creditors formed a lenient repayment schedule, and even then the company missed its debt payments several times.<sup>7</sup> DBCP offered Amvac a way out of the financial doldrums; the company chose to take it.

Amvac's yearly sales of roughly ten million dollars may be dwarfed by the multi-billion-dollar behemoths of the pesticide industry, but Amvac is not alone in profiting from pesticide dumping. In fact, it shares its profits with Dow, which receives a 3 per cent royalty on all DBCP sold by Amvac under a patenting agreement.<sup>8</sup> Thus, even though Dow no longer makes DBCP it still profits via the inter-locking financial arrangements that link the small companies to the large, giving all a share in the global pesticide business.

#### Velsicol's pesticide shell game

The story of the pesticide Phosvel

— and the "Phosvel Zombies" it created — is a chilling example of the cruel shell game the multinational companies can play as they move their poisons from one country to the next, trying to maximize sales before their pesticides are banned again.

Phosvel, the exclusive brand name for an organophosphate nerve toxin called leptophos, was marketed by Velsicol Chemical Corporation, a division of the mammoth Northwest Industries, which distributes everything from Cutty Sark Scotch whisky to Fruit of the Loom underwear.<sup>9</sup>

The dangers of Phosvel became public in 1976, when the U.S. Occupational Safety and Health Administration (OSHA) revealed that workers at Velsicol's Bayport, Texas, plant had developed serious disorders of the central nervous system. Fellow workers dubbed them "Phosvel Zombies" because they lost their coordination, and their ability to work, talk and think clearly. The workers sued Velsicol, and the company closed the plant.<sup>10</sup>

But even after all the publicity generated by the Phosvel Zombie

scandal (including charges by U.S. Senator Edward Kennedy that the company knowingly continued to make Phosvel even after its employees became ill), Velsicol kept selling the pesticide overseas.

Velsicol's marketing of Phosvel shows that even when third world countries join the United States in banning especially dangerous pesticides, the multinational giants who control the global pesticide super-market can often continue to sell dangerous chemicals for years.

Although more than four years have passed since Phosvel's dangers burst into the headlines, there is disturbing evidence that it is still on the market.

The EPA never allowed Velsicol to sell Phosvel in the United States, although it did routinely issue a one-year experimental use permit.<sup>11</sup> Velsicol used this permit to its advantage in Colombia. When the Colombian Committee for Environmental Information began campaigning against the pesticide's disabling side-effects, Velsicol first threatened to sue, then produced its experimental use permit as "proof" that Phosvel has been registered for use in the United States for eight years.<sup>12</sup>

Meanwhile, with four million dollars in AID funds, 13.9 million pounds of Phosvel and other banned pesticides were shipped to 50 countries as part of the U.S. foreign aid program from 1971 to 1976.<sup>13</sup> (This practice was eventually stopped by a lawsuit brought by environmental groups.) In Egypt, a widely publicized Phosvel epidemic in 1971 killed over 1,000 water buffalo and an unknown number of peasants. The victims suffered a slow and agonizing death, gradually paralyzed until they asphyxiated.<sup>14</sup>

#### **Velsicol beats the Phosvel ban**

Although Velsicol says it no longer manufactures Phosvel anywhere in the world, documents show that during 1978 — two years after the notorious Phosvel Zombie publicity — Velsicol imported Phosvel into Costa Rica via three shipments originating in Panama and Mexico.<sup>15</sup> In addition, according to the government of Indonesia, large quantities of Phosvel are still being sold there.<sup>16</sup>

In Colombia, authorities banned

Phosvel in July 1977.<sup>17</sup> Velsicol simply moved its stockpiles of Phosvel to a free trade zone, technically out of Colombian jurisdiction, and then shipped it to nearby countries where it was not yet banned.<sup>18</sup>

Attempts by the company to peddle Phosvel elsewhere, however, met with resistance.

After the Philippines banned Phosvel, according to that country's Pesticide Technical Services Chief Ricardo Deang, "Velsicol came to us and said, 'We want to export our stocks of Phosvel to Thailand.' But we couldn't let them do that to our sister country. So I said, 'You have to prove to us that Thailand really wants this stuff. Otherwise you must send it back to the States for

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**"There was no problem with the ban of DBCP. Our big market has always been exports anyway."**

*Executive of Amvac Chemical Corporation*

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disposal.' So then they ended up shipping it all back to the U.S."<sup>19</sup>

Guatemalan official Fernando Mazariegos remembers, "After the Phosvel scandal in the U.S., Velsicol came to us and said they wanted to study the possibilities for its use in Central America. We turned that request down. I think their purpose was to start selling a lot of it in Central America and in other countries."<sup>20</sup>

Company spokesman Richard Blewitt says Velsicol did not try to mislead officials in Colombia, the Philippines, or Guatemala about Phosvel. But he does admit that "what happened happened. We're trying (to) make sure that (it) never happens again. A new team has been amassed (at Velsicol)."<sup>21</sup>

Phosvel is not Velsicol's only hazardous pesticide. Once Phosvel was removed from the market, at least officially, Velsicol began manufacturing EPN as a substitute. But EPN — now under EPA review — is believed to be twice as neurotoxic as Phosvel.<sup>22</sup> Velsicol also manufac-

tures ingredients for three essentially banned organochlorines — heptachlor, chlordane and endrin — at a plant in Chicago, and formulates the finished products in Memphis. Most of the production is for the overseas market, since endrin use is severely restricted in the U.S., and heptachlor and chlordane are completely banned for agricultural purposes inside the continental U.S. (Like DBCP, endrin may be used on pineapples in Hawaii until the end of 1982 — which testifies less to the need for either pesticide on pineapples than to the political clout of the Hawaiian Pineapple Growers' Association, dominated by Del Monte and Castle & Cooke.)<sup>23</sup>

#### **Hooker: the Love Canal dumper**

The Hooker Chemical and Plastic Corporation — infamous for the Love Canal tragedy — is another pesticide dumper. Hooker is a wholly-owned subsidiary of Occidental — one of the three major firms which ceased DBCP production when workers at its California plant discovered they were sterile.

At the Love Canal near Niagara Falls, New York, thousands of pounds of lethal chemical wastes at an abandoned Hooker chemical dumpsite percolated to the surface twenty years later. This tragedy is still being felt in the residential neighbourhood today, four years since the site was rediscovered in 1976. An unusually large number of children are born with birth defects, adults and children are suffering from high rates of chemically-induced diseases, and a whole way of life has been disrupted as people have been forced to sell their homes to escape the leeching poisons. The Love Canal tragedy was a turning point in the growing movement of people fighting against the invasion of toxic chemicals.<sup>24</sup>

In the third world, Hooker's marketing of pesticides may eventually cause similar tragedies. But third world peasants usually do not have access to information about Hooker's toxic products and practices, and probably will not know what has affected them. In addition, most of them cannot simply move away like many Love Canal residents have done.



One example of Hooker's third world marketing practices occurred in 1976. Hooker voluntarily withdrew its EPA registration of the organochlorine BHC, after feeding tests with mice showed it causes tumors, kills fetuses and causes premature births, and has other dangerous reproductive effects even when absorbed in tiny concentrations. But when it withdrew BHC from the U.S. market, *Hooker explicitly stated that it would continue producing the chemical for use overseas.*<sup>25</sup>

In recent years, records indicate, Ortho has imported BHC into Costa Rica,<sup>26</sup> the German firm Schering imported BHC into Colombia,<sup>27</sup> and, according to U.S. Department of Agriculture cables, BHC was used on coffee grown for U.S. consumption in Peru and Guatemala.<sup>28</sup>

#### The pesticide boomerang

Pesticide pollution does not respect national borders. As one of the world's largest food importers, we in the United States are not escaping hazardous chemicals simply by banning them at home. (See Table One).

Approximately 10 per cent of our imported food contains illegal levels of pesticides, according to the U.S. Food and Drug Administration (FDA).<sup>29</sup> But that 10 per cent is deceptive. The FDA's most commonly used analytical method does not even check for 70 per cent of the almost 900 food tolerances for cancer-causing pesticides.<sup>30</sup> (A tolerance is the amount of a pesticide allowed in any particular food product.)

In addition, the FDA frequently finds mysterious, unknown chemicals in imported foods. Government investigators believe that some of these fugitive chemicals come from the millions of pounds of "unregistered" pesticides the EPA allows U.S. manufacturers to export without divulging any information about their chemical makeup or their effects on people or the environment.

Knowing how little we know, we suspect these statistics from the General Accounting Office (GAO) represent only the tip of the iceberg:

□ Over 15 per cent of the beans and 13 per cent of the peppers

### Selected List of Chemical Companies Producing, Buying and Selling Hazardous Pesticides in the Third World

COMPANY (U.S. unless otherwise noted)	PESTICIDES		
	A Banned or Heavily Restricted	B Under Review	C Unrestricted
Allied Chemical	Kepone, Mirex	—	—
Amvac	DBCP	—	—
American Cyanamid	Kepone, Mirex	Toxaphene, 2,4-D	Malathion Parathion
BASF (W. Germ.)	2,4,5-T	2,4-D	—
Bayer (W. Germ.)	DDT, Heptachlor, Lindane	Toxaphene	Parathion
Celamerck (W. Germ.)	Aldrin, Dieldrin, DDT, Endrin, Heptachlor, Chlordane, Lindane, 2,4,5-T	Toxaphene, 2,4-D	Parathion
Chevron	DDT, Aldrin, Dieldrin, Heptachlor, Chlordane, Endrin, Lindane, BHC, Silvex	Toxaphene, Paraquat	Malathion
Ciba-Geigy (Swiss)	—	2,4-D	—
Dow	2,4,5-T, Silvex, DBCP	2,4-D	—
Dupont	—	EPN	Parathion
FMC	Heptachlor	—	Malathion
W.R. Grace	—	Toxaphene	—
Hercules	—	Toxaphene	—
Hoechst (W. Germ.)	DDT	—	Parathion Malathion
Hooker	BHC, Lindane, Mirex	—	—
Imperial Chemicals (U.K.)	BHC, Aldrin	Paraquat	—
Kerr-McGee Chem.	—	—	Parathion
Monsanto	—	2,4-D	Parathion
Montrose	DDT, Endrin	—	Parathion
Nissan (Jap.)	—	EPN	—
Pfizer	—	—	Malathion
Rohm & Haas	Silvex	Toxaphene	Parathion
Schering (W. Germ.)	Aldrin, BHC, Heptachlor	—	Parathion
Shell (U.K.-Neth.)	Aldrin, Dieldrin, DDT, DBCP, Endrin, 2,4,5-T	2,4-D	Parathion
Stauffer	DDT, Dieldrin	EPN, 2,4-D	Malathion, Parathion, Malathion
Sumitomo (Japan)	—	—	—
Union Carbide	DDT, Mirex, Heptachlor, Chlordane, Endrin	EPN	Parathion
Velsicol	Chlordane, Heptachlor, chlor, Phosvel, Endrin	EPN	Parathion

#### Note:

**Category A:** Those which are banned or heavily restricted inside the U.S. Most uses for these products have been outlawed, but important uses for some remain, such as termite control for Chlordane. Certain pesticides have recently been discontinued, including DBCP (Dow) and Kepone (Allied Chemical), but are included because they were important products for the companies involved.

**Category B:** Those which are under review for future regulatory action. Toxaphene, Paraquat and EPN are termed "suspect chemicals" by EPA.

**Category C:** Those which are unrestricted in the U.S. but which have caused human deaths in the third world. Parathion is reportedly the number one killer among all hazardous pesticides, banned or not.

*Sources: This table was compiled from a variety of official and unofficial sources, including the EPA publication "Suspended and Cancelled Pesticides", EPA production reports; company records and advertisements, personal interviews and observations, and government import statistics for seven third world countries.*

**TABLE ONE**  
**Pesticides Used in Foreign Countries on Food**  
**Exported to the United States**

Commodity	Countries surveyed	Number of pesticides		
		Allowed, recommended or used in the U.S.	Any residue prohibited (no U.S. tolerance)	Not detectable with FDA tests
Bananas	Colombia, Costa Rica, Ecuador, Guatemala, Mexico	45	25	37
Coffee	Brazil, Colombia, Costa Rica, Ecuador, Guatemala, Mexico	94	76	64
Sugar	Brazil, Colombia, Costa Rica, Ecuador, Guatemala, India, Thailand	61	34	33
Tomatoes	Mexico, Spain	53	21	28
Tea	India, Sri Lanka	24	20	11
Cacao	Costa Rica, Ecuador	14	7	7
Tapioca	Thailand	4	4	1
Strawberries	Mexico	13	—	5
Peppers	Mexico	12	—	4
Olives	Italy, Spain	20	14	8
Totals:		340	201 (59%)	198 (58%)

Source: US General Accounting Office

**TABLE TWO**  
**Pesticides in Imported Coffee Beans**  
**(1974-1977)**

Country of Origin	No. of Samples	No. with Residues
Angola	1	1
Brazil	2	2
Colombia	21	5
Costa Rica	2	0
Dominican Republic	1	0
Ecuador	10	6
El Salvador	2	1
Guatemala	5	2
Haiti	1	1
Honduras	2	1
India	4	4
Indonesia	1	1
Ivory Coast	2	1
Kenya	1	0
Mexico	5	4
New Guinea	2	1
Nicaragua	2	0
Panama	1	0
Peru	5	2
Rwanda	1	1
Uganda	1	1
Venezuela	2	1
Total (22):	74	35

Percentage Contaminated: 47.3%

Pesticides Detected: DDT, DDE, BHC, Lindane, Dieldrin, Heptachlor, Diazinon, Malathion

Source: US Food and Drug Administration

imported from Mexico, during one recent period, were found to violate FDA pesticide residue standards.<sup>31</sup>

□ Nearly half the imported green coffee beans contain levels (from traces to illegal residues) of pesticides that are banned in the United States.<sup>32</sup> (See Table Two).

□ Freshly cut flowers flown in from Colombia caused a rash of organophosphate poisonings among American florists.<sup>33</sup>

□ Imported beef from Central America often contains pesticide contamination. The GAO has estimated that 14 per cent of all U.S. meat is now contaminated with illegal residues,<sup>34</sup> and imports make a significant contribution to that total.

The pesticide residue problem has escalated to such a level that all beef imports from Mexico,<sup>35</sup> El Salvador,<sup>36</sup> and Guatemala<sup>37</sup> have been halted by the USDA. Agricultural practices in those countries, including heavy pesticide use on crops next to cattle-grazing land, have backfired on ranchers raising beef for the U.S. market.

Despite the widespread contamination of imported food, FDA inspectors rarely seize shipments or refuse them entry. Instead, a small sample is removed for analysis while the rest of the shipment proceeds to the marketplace . . . and the consumer. The rationale is that perishable food would spoil if held until the test results were known. But by the time the test results are available — showing dieldrin or parathion or DDT residues — the food has already found its way into our stomachs. Recalls are difficult.

During one recent 15-month period, government investigators found that *half* of all the imported food identified by the FDA as pesticide-contaminated was marketed without any penalty to the importers or warnings to consumers! Even products from importers with repeated violations were routinely allowed to pass. Some examples:

□ USDA officials in Dallas noticed a strong "insecticide-like smell" in a batch of imported cabbage from an importer with a record of shipping contaminated products. Despite USDA's complaint, the FDA allowed the cabbage to go to market. A sample that had



been removed for testing later revealed illegal levels of BHC, the dangerously carcinogenic pesticide whose registration was cancelled in 1976 at Hooker Chemical's request. But it was too late to recall the cabbage.<sup>38</sup>

□ Peppers from a shipment that was sent on to supermarkets turned out to have 29 times more pesticide residue than allowed by U.S. law.<sup>39</sup>

In a world of growing food interdependence, we cannot export our hazards and then forget them. There is no refuge. The mushrooming use of pesticides in the third world is a daily threat to millions there — and a growing threat to all consumers in the USA. Therefore we and third world people are allies in a common effort to halt the production of hazardous pesticides and contain all pesticide use to safe levels.

### Pesticides to feed the hungry?

"We see nothing wrong with helping the hungry world eat," says an executive of the Velsicol Chemical Company, defending his company's overseas sales of Phosvel after it was banned in the United States.<sup>40</sup> And many would agree with his logic: since we need pesticides to produce more food for the hungry, pesticide dangers are a necessary evil — part of the price of averting famine. "Men will not starve because there are hazards in killing pests," is the way a Rohm & Haas official makes the same point.<sup>41</sup>

But in the course of our investigation, we came to a startling conclusion: over half, and in some countries up to 70 per cent, of the pesticides used in underdeveloped countries are applied to crops destined for export to consumers in Europe, Japan and the United States.<sup>42</sup> The poor and hungry may labor in the fields, exposed daily to pesticide poisoning, but they do not get to eat the crops protected by pesticides.

In Central America a staggering 70 per cent of the total value of agricultural production — mainly coffee, cocoa and cotton — is exported, despite widespread hunger and malnutrition there.<sup>43</sup> Cotton is one of the biggest pesticide users. In tiny El Salvador, cotton production absorbs one-fifth of all the deadly parathion used in the world.<sup>44</sup>

Twenty-four hundred pounds of insecticides are used each year on every square mile of cotton fields in the country.<sup>45</sup> Yet cotton contributes to the global food supply only in processed cattle feed for Latin America's burgeoning beef production, almost half of which is exported to the United States and Europe.<sup>46</sup> The meat remaining for local consumption is eaten by the rich and the middle classes, not by the hungry.

Herbicides like 2,4,5-T and 2,4-D (the basic ingredients of the infamous Agent Orange) are also used to help clear huge amounts of forest for grazing land in Latin America. The herbicide 2,4,5-T leaves residues of dioxin in soil and water. Dioxin, one of the deadliest poisons ever developed, shows up later in birth defects, skin rashes and miscarriages.

In Indonesia, estate-style farms growing export crops — coconuts, coffee, sugar cane and rubber — consume 20 times the quantity of pesticides used by the small holders growing food for local markets. This, despite the fact that small holders cultivate seven times more acreage than the estates.<sup>47</sup>

Some might argue that although export crops do not directly feed hungry people, at least the foreign exchange earned benefits them indirectly: it is used to import economic necessities for development. But even the most superficial look at development in most third world countries belies this assumption. Foreign exchange earned by agricultural exports does not return to improve the lives of the workers through better wages, housing, medical care, or schools. Instead the foreign exchange is most often plowed into luxury consumer goods, urban industrialization, tourist facilities, and showy office buildings — all geared to the budgets and tastes of the top 10 to 20 per cent living in the cities.

### The perfect banana

One reason pesticide use is so much more intense on export crops than on subsistence food crops is that the multinational corporations which control the production and marketing of exports demand a blemish-free product. Nothing less,

they say, will meet the discriminating standards of the consumers in Europe, North America or Japan.

"The Japs eat with their eyes" is how the manager of a Philippine banana plantation explained why they went to such lengths to produce a blemish-free fruit to ship to Japan.<sup>48</sup> In the United States, too, it is estimated that 10 to 20 per cent of insecticides used on fruits and vegetables serve only to improve their appearance.<sup>49</sup>

Most people think of multinational food corporations in the third world as big plantation owners. But over the last 20 years, corporations have become leery of owning land directly. As the U.S. Overseas Private Investment Corporation warns, the possibility of "expropriation, revolution or insurrection (makes) plantations a poor risk."<sup>50</sup> Multinational food producers and marketers such as Del Monte, United Brands (formerly United Fruit), and Castle & Cooke (Dole brand) have hit upon a safer strategy — contract farming. Rather than own land directly, these companies now often contract with large local landowners to produce crops for export to consumers in the industrial countries.

A contract farming boom hit southern Mindanao, the Philippines, in the late sixties. Before that time there were no bananas growing on its rich coastal plains. Small farmers and tenant farmers grew rice and abaca. Then came the multinational corporations, seeking contracts with local entrepreneurs to produce bananas for the lucrative Japanese market. Within ten years the entire area was transformed: now 21 giant plantations cover 57,000 acres, and bananas have become one of the country's top agricultural exports.<sup>51</sup> In order to fulfill their banana contracts, the local entrepreneurs had to push small holders, tenants and "squatters" off the land. (Some of the so-called squatters had worked the land for more than a generation.)

Although the multinational corporation may not own the land, it still calls the shots. When the corporation signs a local entrepreneur under contract, it specifies not only the amount of fruit or other commodity to be produced but also

the amount of fertilizers and pesticides to assure high yields and blemish-free products.<sup>52</sup>

### **Lifetime debt to pesticide companies**

Once locked into the banana export contract, the plantation owner is totally dependent on the multinational firm, "Money is deducted from the banana grower's earnings to pay for things like pesticides and irrigation," explains Father Jerome McKenna, a U.S. missionary who worked in the area. "It's part of the contract. Those banana growers will be in debt to the pesticide companies for the rest of their lives."<sup>53</sup>

Typically pesticides are applied at three stages in the banana production process. Workers with heavy tanks strapped to their backs (and no masks or protective covering) routinely spray every tree. Twice a month a pesticide plane passes over the plantation, blanketing everything, including the drinking water supply. A group of banana workers recently petitioned Castle & Cooke to stop heavy pesticide spraying after local studies showed that the workers have dangerously low oxygen levels in their blood, making them more susceptible to disease.<sup>54</sup>

In the packing sheds, the bananas are dumped in long water-filled troughs to remove some of the pesticides. "What bothers me most," says McKenna, "is that these people have very little protection from the chemicals they come in contact with. The women have their hands in the water up to their elbows all day long. They don't wear any gloves. Their only protection is plastic-type aprons they fashion for themselves."<sup>55</sup> Finally, to protect the fruit during its long ocean voyage, women workers in the packing sheds spray every bunch of bananas with a fungus-killing agent.<sup>56</sup>

McKenna checked at two nearby hospitals for reports of pesticide poisonings. One, run by Castle & Cooke, "didn't have any cases." But the other hospital, run independently of the company, had "reports all around of people poisoned by pesticides."<sup>57</sup>

The contract farming system also gives the multinationals an easy way to avoid responsibility for

pesticide poisoning. They can simply blame the local plantation owner for being careless.

The examples of cotton in El Salvador or bananas in the Philippines tell us that, in large measure, pesticides in the third world actually feed the well-fed, but endanger the poor and the hungry. Since the mid-50s, the growth rate of export crops — which receive the overwhelming bulk of pesticides — has exceeded that of food crops.<sup>58</sup>

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### **"An estimated 10 per cent of the food imported into the United States contains illegal levels of pesticides."**

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Between 1952 and 1967, for example, cotton acreage in Nicaragua increased fourfold while the acreage in basic grains was cut in half.<sup>59</sup> Thus it is hardly surprising that the demand for pesticides in the third world has soared. What is surprising is how many believe that their principal use is to save crops to feed the hungry.

### **More food and yet more hunger**

While it is true that most pesticides in the third world are used on luxury exports crops, in the last 20 years third world farmers growing basic food crops — especially rice and wheat — have also been encouraged to use ever greater quantities of pesticides. As part of the "green revolution," hybrid seeds were developed which produced higher yields, given the correct amount of fertilizer and water; but the hybrids are much more susceptible to pests. Bred in the laboratory and in test fields in a foreign setting over only a few years, these "miracle seeds" do not have the pest resistance characteristic of traditional seeds, bred over thousands of years in the same locality in which they are used.<sup>60</sup> To make up for this vulnerability, the new seeds must be protected with more pesticides.

Throughout much of the third world, international lending agencies and government development programs have encouraged the use of these new seeds, often making their use a condition for receiving farm credit.<sup>61</sup> Once third world farmers begin using the new, more vulnerable seeds, they have no choice but to vastly increase their use of pesticides.

Few dispute that the new seeds and their accompanying inputs — fertilizers and pesticides — have increased grain production, notably in Asia. But growing more food doesn't necessarily mean alleviating hunger. What we have learned is that food production can increase while the poor majority gets even more hungry.

Take the Philippines. It is the home of the prestigious International Rice Research Institute which helped instigate the "green revolution" in Asia. During the 1970s, use of the new seeds spread throughout the country. Accompanying their proliferation, pesticide imports leapt fourfold between 1972 and 1978.<sup>62</sup> As a result of the new seeds and new inputs, rice production almost doubled in the Philippines in little more than a decade.<sup>63</sup> Indeed, in the late 1970s, the Philippines became a rice exporter. But has this production success reduced the hunger of the Philippine poor? No. According to studies by the Asian Development Bank and the World Health Organization, Filipinos are now the worst fed people in all of Asia, with the exception only of war-torn Kampuchea.<sup>64</sup>

How can there be more food produced and yet greater hunger? The answer is that the green revolution strategy for producing more food forces more and more people off the land. Mechanization robs them of work. Dependency on irrigation, pesticides and fertilizers — all required by the new seeds — favors the wealthier, literate farmers who have access to credit and political pull. Without land to produce food or money to buy it, people go hungry no matter how much their country produces.

This dramatic transformation is documented in the International Labor Organization's study of rural



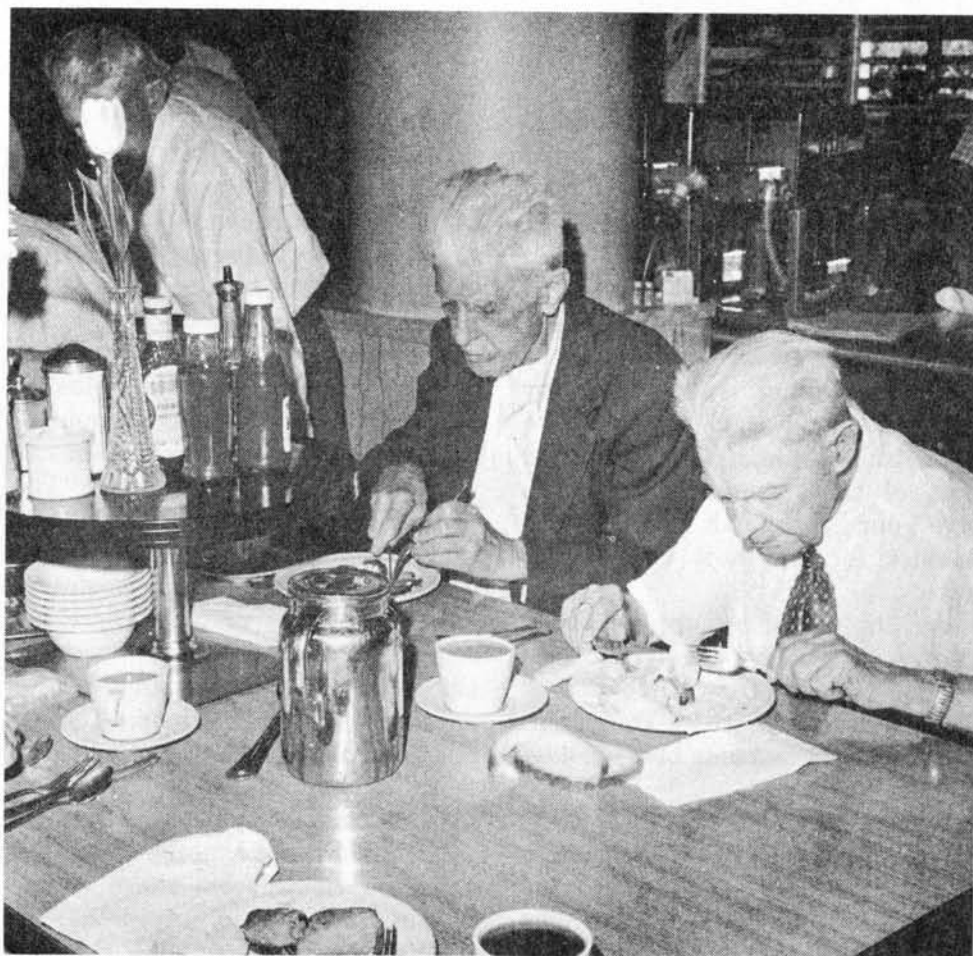
poverty. After studying seven Asian countries, comprising 70 per cent of the rural population in nonsocialist underdeveloped countries, the ILO reported that the rural poor have become measurably poorer than they were 10 or 20 years ago. The study concludes: "The increase in poverty has been associated not with a fall but with a rise in cereal production per head, the main component of the diet of the poor."<sup>65</sup>

Another ILO study of the "green revolution" points to vast increases in wheat yields in the Punjab district of India in the 1960s. Yet simultaneously, the portion of the rural population living below the poverty line increased from 18 to 23 per cent.<sup>66</sup> "Economic prosperity has not simply missed these people," the study concludes. "Their ability to supply their own basic needs has been gradually but unrelentingly reduced..."<sup>67</sup>

#### The poor: not a lucrative market

The narrow production push embodied in the "green revolution" strategy, helping to enrich the well-placed farmers and further impoverish the rural poor, has itself encouraged the shift toward export crop production that we discussed above. This is true in part because impoverished people simply do not make up a lucrative market. So, as in the Philippines, a staple food like rice is exported while Filipinos — without money enough to buy the rice — go hungry. Or production shifts from staple foods needed by the poor and toward luxury items demanded by the rich. Corn and bean production in Mexico, for example, has declined while production of luxury fruits and vegetables for the U.S. market and feedgrains such as sorghum have greatly increased. Almost 32 per cent of basic grain staples are now fed to livestock in Mexico.<sup>68</sup> In Brazil the figure is 44 per cent.<sup>69</sup>

Thus the rationale of using more pesticides to protect crops to feed the hungry simply does not hold up. First, we discover that most pesticides are not used to protect food crops anyway! Second, pesticides to protect the more vulnerable grain seeds of the "green revolution" are part of a production strategy benefiting the better off. While



"Despite the widespread contamination of imported food, inspectors from the US Food and Drugs Administration rarely seize shipments or refuse them entry. Instead, a small sample is removed for analysis while the rest of the shipment proceeds to the marketplace... and the consumer. The rationale is that perishable food would spoil if held until the results are known. But by the time the test results are available — showing dieldrin or parathion or DDT residues — the food has already found its way into the consumer's stomach. Recalls are difficult."

increasing production, this strategy cannot eliminate hunger because it fails to address the question of *who controls* that production. Under these conditions, the extra food which pesticides help to grow is frequently either eaten by the better off, exported or fed to livestock. The whole equation bypasses the fundamental problem: the hungry have neither money to buy food nor land to grow it on.

#### The global pesticide supermarket

From the billboards of rural Nebraska to shantytown walls in Kenya, pesticide company advertising is part of the scenery. The language may be English or Spanish or Swahili, but the message is the same: you need our brand of pesticide if you want a good crop.

"Whenever a new pesticide hits the area, every farmer knows about it right away," says Dr. Lou Falcon, a University of California entomologist who has studied Central

America. "There is heavy publicity by the companies — big billboards, radio and newspaper ads."<sup>70</sup>

Using sophisticated marketing techniques and their worldwide network of subsidiaries and affiliates, the giant multinational pesticide manufacturers — such household names as Dow, Shell, Chevron, Bayer, Dupont — have created a global supermarket, its shelves stocked with products so dangerous they have been banned in the countries where they have been investigated.

As we have said, the multinationals claim they sell pesticides overseas merely to supply a demand for their products to help feed a hungry world. But the fact is that multinational companies use sophisticated mass marketing techniques to *create* a demand in the third world.

"Those pesticide boys are all over the place down there," says Michael Moran of the Interamerican Instit-

ute for Agricultural Sciences in Costa Rica. "Bayer is trying to sell anything they can. It's amazing how they get down to the grass roots. Very few places are left in Latin America which are in isolation from the new technologies, including pesticides."<sup>71</sup>

"We have overseas offices in almost every country in Asia," explains René Montmeyor, an agricultural product supervisor for Stauffer Chemical Company. "We have exclusive distributorships in most of those countries, too. We have our technical people who instruct farmers how to use our pesticides."<sup>72</sup>

Ads for pesticides appear prominently in third world agricultural journals. Away from the eyes of U.S. regulators, pesticide companies often extol the virtues of pesticides banned in the U.S.

At a supply center for the Kenyan Farmer's Association in Nairobi, a reporter spotted aldrin, BHC and chlordane — all banned from most uses in the United States — for sale on shelves and listed in the association's inventory. They were being sold by local subsidiaries of European pesticide companies — ICI, Bayer and Shell.<sup>73</sup>

### Formulating their way around regulation

To escape regulation in their home countries, the multinationals have discovered a clever strategy: they simply ship the separate chemical ingredients of a banned pesticide to a third world country, then manufacture it there in "formulation plants." From the third world country, the prepared pesticide can often be re-exported to any third country, free of regulation.

"It's a real Mafia-type operation," says Dr. Harold Hubbard of the U.N.'s Pan American Health Organization. "Global companies are setting up formulation plants all over the world. (They) simply go into less developed countries, give a banned pesticide a local name, and then turn around and sell it all over the world under that new name."<sup>74</sup>

"Formulators buy basic ingredients from importers and then put them together and call the product a name like 'Macho' and say it will kill anything," explains Frank Penna, a

consultant to the Policy Sciences Center. "Usually it ends up killing the farmer."<sup>75</sup>

(Macho competes with other chemical weapons with such names as Ambush and Fumazone to battle an army of enemies led by kernel smut, the stinkbug, the whorl maggot, and the black whip and tip smut.)

The pesticides are dangerous before they ever reach the fields. A plant in Kenya which formulates BHC provides no protection for the workers mixing the chemicals. "The workers' eyes were all sunken, and they looked like they had TB," says a University of Nairobi professor who visited the plant. "There are regulations against this sort of thing, but there is no manpower for enforcing the regulations. And no one complains. The workers are perfectly happy until one of them gets sick, and then he's just fired."<sup>76</sup>

In Latin America, "you can see the dust rising from those formulation facilities for miles," says AID's Whittemore. "I wouldn't dare walk into some of them. There are no decent health or environmental standards for most of them — it's a terrible problem."<sup>77</sup>

The worst formulators, Penna says, are the "pirate operators — little whiskey-still-like operations." An estimated 8,000 of them have opened in Brazil alone.<sup>78</sup> But the large-scale formulation plants are foreign-owned.

Like many other third world countries, Brazil offers special incentives to bring foreign chemical plants into the country: deferral of taxes, exemption from import duties, government-sponsored clearing of land for the plants.<sup>79</sup> Shell has put \$20 million to \$30 million into new plants under these incentives over the past few years. Dow has a 2,4-D plant there.<sup>80</sup> The Swiss firms Sandoz and Ciba-Geigy set up a joint operation.<sup>81</sup> And the largest pesticide company in the world — Bayer — has formulation plants in Brazil as well as in virtually every other country with a market large enough to warrant one.

Formulation plants are also spreading throughout Asia:

□ *India.* Many pesticides that have been banned or heavily restric-

ted in the United States are produced in India, including BHC and DDT.<sup>82</sup> Union Carbide, ICI, Bayer, and Hoechst have plants there.<sup>83</sup>

□ *Malaysia.* Dow and Shell alone formulate one-quarter of all liquid pesticides here. Three organochlorines banned in the United States — aldrin, DDT and BHC — constituted 730 of the 960 tons of pesticides manufactured in Malaysia in 1976.<sup>84</sup>

□ *Indonesia.* Bayer, ICI, Dow, and Chevron dominate the local pesticide manufacturing industry, accounting for over 70 per cent of the total production in 1978.<sup>85</sup>

This trend toward formulation plants is paralleled in many heavily regulated industries which are also moving their production facilities overseas.

### Seeds: the final round?

The multinational pesticide producers already control the manufacturing, distribution and promotion of pesticides at the global supermarket. Now they are working on a strategy to control an even more basic agricultural "input," the seeds themselves.

"Where might a chemical company interested in agricultural chemicals go?" rhetorically asks a high official of the Chemical Manufacturers Association. "Obviously, into seeds," he answers. "Some members of the chemical industry are getting into seed development."<sup>86</sup>

The FAO estimates that by the year 2000, 67 per cent of the seeds used in underdeveloped countries will be the "improved" varieties, which in most cases are more vulnerable to pests.<sup>87</sup> Since virtually all pesticides are produced in the industrial countries, that means more pesticide exports to the third world.

For the agri-chemical multinationals, plant patenting provides greater inducement to add seeds to their conglomerate families. Championed by the American Seed Trade Association and the USDA, controversial legislation to allow the patenting of all U.S. crop varieties has been debated in Congress since early 1980.<sup>88</sup> The bill would extend the parent umbrella to six crop varieties that were excluded from the original



1970 plant protection act.<sup>89</sup>

Already a few multinational corporations, many of them pesticide producers, control the seed patents for several important crops. Of the 73 patents granted for beans, for example, over three-quarters are held by just four corporations: Union Carbide, Sandoz, Purex, and Upjohn.<sup>90</sup> Two Swiss-based companies, Sandoz and Ciba-Geigy, alone control most of the U.S. alfalfa and sorghum seed supply.<sup>91</sup>

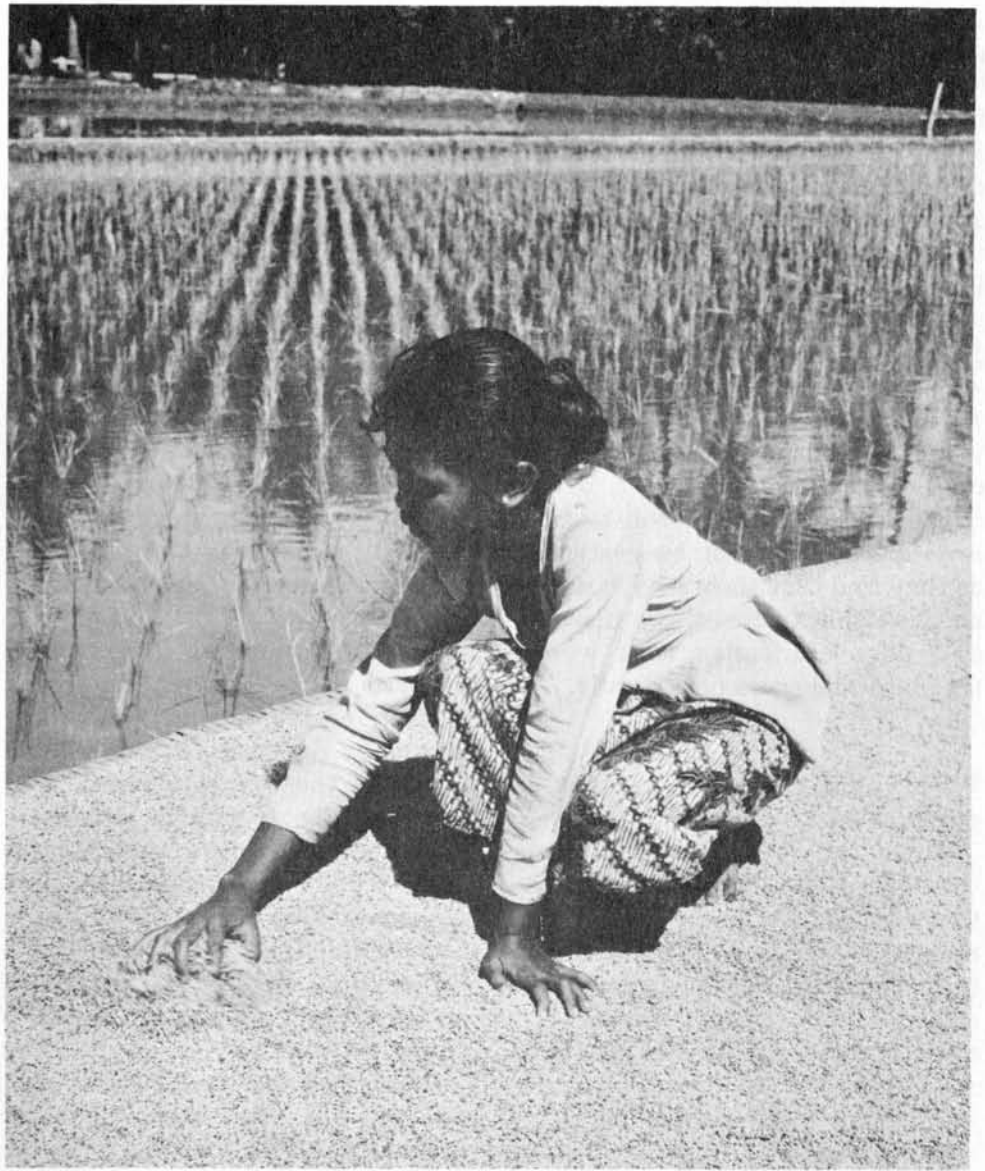
Chemical companies are buying traditional seed supply firms, and their patentable "commodities," at an alarming rate. After the first wave of acquisitions, the international pesticide giants Monsanto, Ciba-Geigy, Union Carbide, and FMC are ranked among the largest seed companies in the United States.<sup>92</sup> Between 1968 and 1978, multinationals — mainly chemical and pharmaceutical companies — bought 30 major seed companies. Today, the largest seed enterprise in the world is Shell, the oil and petrochemical giant which controls 30 seed outfits in Europe and North America.<sup>93</sup>

Entering the \$10-billion-a-year seed industry is a natural for the multinational pesticide producers. They already have the marketing and distribution structures for reaching the smaller farmer throughout the world, explains *The Global Seed Study*, a \$25,000-a-copy investment guide sold to potential seed investors.<sup>94</sup> The study points out how seeds and chemicals can work together, as in the possibility of "seed coatings and pelleting, utilizing the seed as a delivery system for chemicals and biologicals to the field."<sup>95</sup>

By cornering the global seed market, the companies apparently plan to insure that farmers the world over are dependent on their seeds, as well as their fertilizers and pesticides.

"Obviously they're being damn quiet about it," says an industry official. "But some of those high yield seeds require particular applications of fertilizers and pesticides to produce their high yields."<sup>96</sup>

Now that the chemical companies have entered the seed business, they hold the enviable economic position of helping to aggravate the (pest)



Seeds of discontent? Multinational companies are now moving into the seed market, developing new 'improved' varieties that often require large applications of specific pesticides — more often than not those controlled by the companies themselves. By the year 2000, the Food and Agricultural Organisation estimates that 67 per cent of the seeds used in Third World countries will be of these 'improved' type.

problem for which they also offer their (chemical) cure. If the chemical industry's monopolization of the world's seed stock is successful, we will be one critical step closer to the ultimate corporate vision of the global supermarket, where every grower in the world is hooked on patented seeds and the pesticides they require.

#### Genetic uniformity

Common non-patented varieties often become extinct and disappear as seed varieties are patented. By 1991, the FAO's Erna Bennett estimates, three-quarters of all vegetable varieties now grown in Europe will be extinct due to patenting, which is more advanced in Europe than in the United States.<sup>97</sup>

As fewer seed varieties are used to

grow larger crops, the earth's genetic base is narrowing.<sup>98</sup> At the same time, the uniform high-response variety seeds of the green revolution are displacing centuries-old varieties and accelerating their disappearance from the earth's seed stocks.

The implications of this genetic uniformity may be devastating for our food supply. The hybrid, high-yielding seeds do not have an inbred resistance to pests and are usually planted in huge fields that can satisfy swarms of the same type of pest. "If the crop is a monoculture, you no longer have the buffers of different varieties of crops," adds a congressional aide working on the plant patenting issue. "What you've got instead is a super-highway for these insects."<sup>99</sup>

Scientists now suggest that genetic uniformity was the underlying cause of the Irish potato famine in the late 1840s. Then, a single potato variety imported from the Caribbean was struck by blight and over one million people starved to death.<sup>100</sup> More recently, the United States had a glimpse of what this genetic uniformity means, when 15 per cent of the nation's corn crop was destroyed by a pest epidemic in 1970.<sup>101</sup> (Only six seed types make up 71 per cent of the domestic corn crop.<sup>102</sup>)

The world's farmers will become even more dependent on pesticides as they find that their seed varieties are less able to resist the diseases and pest epidemics that sweep through local areas periodically.

#### With the advice and consent of government

While the Export-Import Bank, the Overseas Private Investment Corporation, and even the Department of Agriculture are busy subsidizing and promoting pesticide exports, the one U.S. agency directly responsible for pesticide regulation — the Environmental Protection Agency (EPA) — is strained beyond its capacity to cope with the enormous volume of potentially dangerous chemicals under its jurisdiction. Its warehouses already contain records for over 35,000 chemicals.<sup>103</sup> At least 1,000 new substances are introduced

every year.<sup>104</sup> EPA records catalogue a grisly range of toxic effects: the ability to kill, deform, mutate, and cause brain damage and cancer in living and future generations of animals, including human beings.

The EPA is hamstrung. Due to congressional funding cutbacks and industry pressure, the staff and budget employed to work on pesticides are smaller than those in any one of the 12 large companies which dominate the industry that the EPA is supposed to regulate.<sup>105</sup> The EPA has essentially thrown up its hands, allowing large numbers of "conditional" registrations of pesticides which have not yet been thoroughly tested.

The EPA's monthly enforcement reports chronicle an unending pattern of major and minor violations by pesticide companies, and illustrate the agency's inability or unwillingness to punish violations. The infrequent fines — usually less than \$5,000 — are insignificant to a multinational corporation. Chevron, for example, was fined only \$3,200 for shipping dieldrin in violation of an EPA suspension order.<sup>106</sup> And a suspension order is one of the strongest actions the EPA can take. Velsicol was fined only \$1,600 for failing to register, and for misbranding, the deadly phenoxy herbicide 2,4-D.<sup>107</sup>

If domestic control seems dangerously lax, the international situation is even worse. U.S. law explicitly allows manufacturers to

export banned or restricted pesticides.<sup>108</sup> The EPA cannot force U.S. manufacturers to cease production of any pesticide as long as it is destined for overseas use. (Other agencies could force a company to stop production, if, for example, it was disabling workers at the American plant.)

Moreover, companies do not have to register their pesticides. And they are free to make "for export only" any unregistered pesticide they please. They do not even have to inform the EPA of the substance's ingredients. *Unregistered pesticides now account for more than 25 per cent of all U.S. pesticide exports, according to the GAO.*<sup>109</sup>

Shortly before he left office, President Carter issued an executive order clamping down on the export of hazardous materials, including pesticides banned in the US, to the Third World. That executive order was revoked by President Reagan almost as soon as he entered the White House. For the time being, then, it looks as if the multinational chemical corporations will continue to have it their way, perpetuating a scandal that makes a mockery of the victories won by environmentalists in the 1960s and 1970s. Inevitably, the losers will be Third World peasants, those who work in the plants manufacturing the pesticides for export, consumers throughout the West and, of course, the environment. How long can the Circle of Poison be allowed to continue?

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## Changing Views of Nature

by  
**Brian Morris**

For several centuries, now, Western thought has been dominated by a mechanistic attitude towards Nature. Today, an ecological world-view is emerging. Wherein lie its roots? And is there any place in it for mysticism?

Let me quote initially from *Black Elk Speaks* — the autobiography of an Ogiala Sioux Indian, as recorded by John Neihardt. Interestingly, when this book was first published (in 1932) it met with little response, and it had to be “remaindered” by the publishers.

Republished thirty years later, in paperback edition, when the American public had by then become aware of environmental issues, the book became a best seller — and has since become something of a classic. In the opening pages, Black Elk describes to Neihardt, the relevance of the Indian sacred pipe. He says:

“Before we smoke, you must see how it is made and what it means. These four ribbons hanging here on the stem are the four quarters of the universe. The black one is for the west where the thunder beings live to send us rain. The white one for the north whence comes the great white cleansing wind; the red one for the east, whence springs the light, and where the morning star lives to give men wisdom; the yellow for the south, whence comes the summer, and the power to grow.

But these four spirits are only one spirit, and the eagle feather here is for that one, which is like a father, and it is also for the thoughts of men that they should rise high as the eagles do. Is not the sky the father and the earth a mother, and are not all living things with feet or wings or roots their children? And this hide upon the mouthpiece here, which should be bison hide, is for the earth, from whence we come and at whose breast we suck as babies all our lives, along with all the animals, and birds and trees and grasses. And because it means all this, and more than any man can understand, the pipe is holy”.

And when he has lit this pipe, he recites a prayer — or rather, as he puts it “I said a voice”, for even his own words are not described in a possessive sense. He recites:

“Hear me, four quarters of the world — a relative I am. Give me the strength to walk the soft earth, a relative to all that is.”

This is more than just poetry — though it is poetic — it reflects an attitude of mind, an attitude towards the natural world. We ourselves no longer think in these terms. And the attitude it expresses is essentially religious and anthropo-



morphic; it conceives of the world — spirits, men and natural phenomena — as an inter-related totality. Black Elk views nature as part of a cosmic unity symbolised by a tobacco pipe which is both spiritual and animate. The 'morning star' "lives", — it is a spirit that gives men wisdom; the earth is a mother; and Black Elk sees himself as having some sort of kin relationship with living things. As I implied, this is not simply metaphor, nor did Black Elk hold any sentimental attitudes towards nature: the Sioux were no vegetarians, and they led a rather spartan existence focused on the hunting of buffalo on the high plains of Dakota. But more important, this attitude towards nature must not be seen as some isolated case, for Black Elk's autobiography, in essence, reflects a viewpoint that is widespread among non-industrial communities. In fact it is the perspective reflected in the world-views of most pre-literate peoples — as the studies of several anthropologists have indicated. In such communities the natural world is seen in anthropomorphic terms; spirits permeate matter, such that the world is seen as animate — leading some anthropologists to use the term 'animism' to describe traditional religions. Within such a cosmology spirits, the social life of humans and nature cannot be compartmentalized. Natural phenomena, for example, may be thought of as spirits; social events — especially moral transgressions — may give rise to natural calamities, via spiritual agencies; symbolic associations or transformations are made between, what to us, are diverse events or entities. And common everyday things, may be invested with a deep symbolic or cosmological significance.

#### Plato: the World as a Living Entity

Now one does not have to read anthropology in order to find examples of such a cosmological perspective towards the world — you need only turn to Plato, for the ancient Greeks looked upon the natural world in much the same way as Black Elk.

Greek natural science was based on the idea that the natural world, the universe, was animate — a kind of living organism. This idea of

nature was based on the simplest analogy, that of the human body, with its thoughts and feelings. Let me approach Plato through the Roman poet Ovid. This is the creation myth depicted in his work *Metamorphoses*, the very title of which suggests conceptual ideas that are foreign to us, namely that there can be transformations of entities which ordinary experience would seem to separate. This is the myth — a myth to us — but not to the Greeks.

"Before there was any earth or sea, before the canopy of heaven stretched overhead, Nature presented the same aspect the world over, that to which men have given the name *Chaos*. This was the shapeless, uncoordinated mass, nothing but a weight of lifeless matter . . . Although the elements of land and air and sea were there, the earth had no firmness, the water no fluidity, there was no brightness in the sky. Nothing had any lasting shape, but everything got in the way of everything else.

This strife was finally resolved by a god, a natural force of a higher kind, who separated earth from heaven, and the waters from the earth, and set the clear air apart from the cloudy atmosphere. When he had freed these elements he bound them fast each in its separate place, forming an harmonious union . . . In this way the god, whichever of the gods it was, set the chaotic mass in order."

This is pure Plato: but I quote Ovid because this extract is more readable than translations of the philosopher's main treatise on nature, *Timeaus*. But one small extract from this latter work is appropriate here. Plato wrote:

"Desiring then, that all things should be good and nothing imperfect, the god took over all that was visible . . . and brought it from disorder into order . . ."

"For the God, wishing to make this world most nearly like that intelligible thing which is best and in every way complete, fashioned it as a single, visible living creature . . . with sense and reason"

That's Plato. Now here are some interesting things about this theory. *Firstly*: God did not create matter, but rather acted as a kind of craftsman and took over a pre-existing and disordered natural world, and fashioned it according to an eternal

and ideal pattern. In Plato's philosophy this pattern or unchanging order is equated with an intelligible world of forms or ideas, which, as it were, lie behind a changing and visible reality.

*Secondly*: this ideal or divine blueprint is based on the notion of an ideal living creature with mind and reason — and all parts of the universe are simply aspects of it or as Plato puts it; "contained" within the living creature there are four different forms

"one, the heavenly race of gods, second, winged things whose path is in the air; third, all that dwells in the water; and fourth, all that goes on foot on dry land".

*Thirdly*: nature, or natural things are essentially seen by Plato as in the process of 'becoming' — moving towards the realization of this ideal form, conceived by God, the realization of their essence.

You can see here why for the Greeks the term nature did not simply mean the totality of natural things, as we generally understand the term — for they did not distinguish between nature and spirits (or supernatural) but rather between the world of necessity and the unchanging world of 'forms', the groundplan based on a living creature. "Nature" was that aspect of a thing, its essence, which made it behave the way it did.

*Fourthly*: for Plato the basic constituents of nature consisted of four elements — air, fire, earth and water; and these elements were linked, in a complex symbolic logic, to many other aspects of human experience, for example Greek disease concepts and the theory of the four humours.

For the Greeks, as these ideas are reflected in the ideas of Plato, the world was a kind of living organism, not only alive but rational and intelligible, a world in the process of becoming. Human beings and other living creatures were simply a part of this totality, or cosmic order, that was divinely created — at least the order was created if not the earth itself. In a sense divinity . . . perfection, is at the end of a process rather than at the beginning, which was why Aristotle could say, the world loved God.

This kind of anthropomorphic,

cosmological attitude towards the natural world was evident in Europe throughout the medieval period — in fact European thought itself was permeated by the ideas of Plato and Aristotle. The most popular book of the Middle Ages *The Consolation of Philosophy* by Boethius was instrumental in disseminating such ideas and it is interesting how Plato's external order, becomes in Boethius, Providence, the unchanging plan for the universe, in the mind of God. This kind of perspective implies three basic tenets:

- a) the world consists of a totality of inter-related things, incorporating spirits, humankind and nature, a totality that is symbolically and meaningfully expressed.
- b) Nature itself is permeated with spirit, or mind; it is a living entity; the world is animate, or vital.
- c) There is no separation between man and nature, or between the individual and society — but all are encompassed in a spiritual order, where everything has its place or purpose.

Around 300 years ago this cosmological attitude towards nature was shattered, or rather it began to disintegrate due to a series of fundamental changes in the human situation — as these unfolded in the European context.

### The Shattering of the Platonic World View

There have in fact been two major upheavals in man's history. The first occurred around six thousand years ago with the advent of intensive agriculture and the emergence of centralized city states. This happened independently in several areas, and the changes were quite fundamental. Ovid himself graphically described them. But although the political and social changes were profound, hence the term neolithic revolution, basic attitudes towards the world remained essentially the same. If anything, due to the emergence of a class of religious specialists or literati, cosmological ideas became even more elaborate and systemized as one quickly realises in studying the religious philosophies of all the early civilizations — whether Aztec,

Assyrian, Egyptian, Hindu, Buddhist or Chinese. The reason that there was little shift in conceptual ideas, was because mankind was still fundamentally tied to the land, as a productive resource.

The revolutions and changes that occurred some 300 years ago were of quite a different order, because they wrenched a part of mankind away from any direct contact with the natural world. Such changes have been variously described. Political theorists have emphasized the rise of individualism, and the implementation of a form of government based on some sort of democratic control. Sociologists have stressed a fundamental change in the nature of human relationships, a change from

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**“In tune with the kind of social relationships that the capitalist economy was generating, nature itself came to be seen as a kind of commodity.”**

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community to society; a change from a situation where social relationships were mainly ascriptive and allegiance to kinship important, to one where they are based on contract, and the crucial allegiances were political. Economic historians have discussed changes in technology, the rise of science and the emergence of capitalism. All these changes are interrelated for what essentially occurred was a complete change in the mode and nature of production. And it has two aspects.

*Firstly:* machines replaced land, as a primary resource or factor in production. *Secondly:* money, and the type of exchanges associated with barter trade — which hitherto had been limited to exchanges involving goods — began to permeate all aspects of social life, for not only land but human labour itself became a commodity that was bought and sold.

### Newton and the Mechanistic View of the Universe

Inevitably, and in a sense corresponding to these socio-economic changes, a shift also occurred in man's conception of nature, and in man's relationship to the universe. To illustrate this new conception of the world, I will quote again a relevant extract:

“Since the Ancients esteemed the science of mechanics of greatest importance in the investigation of natural things . . . I have in this treatise cultivated mathematics as far as it relates to philosophy. The ancients considered mechanics in twofold respect: as rational, which proceeds accurately by demonstration, and practical. To practical mechanics all the manual arts belong. But . . . artificers do not work with perfect accuracy. However, the errors are not in the art, but in the artificers. He that works with less accuracy, is an imperfect mechanic, and if any could work with perfect accuracy, he would be the most perfect mechanic of all”.

These are the opening words of Isaac Newton's book *The Mathematical Principles of Natural Philosophy* published in 1686, one of the most important books ever published. Both Pythagoras and Plato had seen mathematics and geometry as the key to our understanding of reality, and Newton explicitly follows this tradition, but with an important twist. For Newton the world is not seen as a living organism, but as a kind of machine, and he sees himself as a kind of super mechanic, using mathematical theorems in order to discover the workings of this machine. And how do we do this? Newton writes:

“Natural philosophy consists of discovering the frame and operations of nature, and reducing them, as far as maybe, to general laws — establishing these rules by observations and experiments, and thence deducing the causes and effects of things . . .”.

In this philosophy nature is seen not in cosmological but in *mechanistic* terms; and the world is conceptualised very much as we now conceive of it in common sense understanding namely as consisting



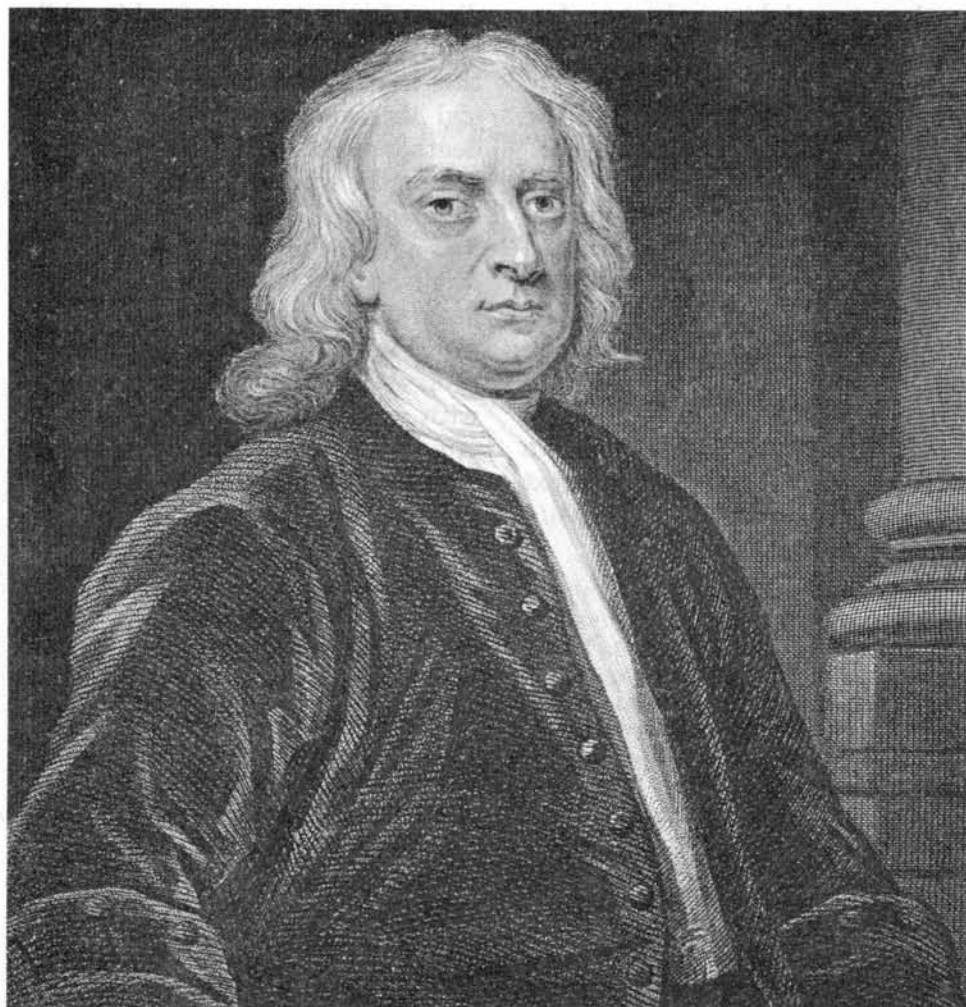
of bits of matter, moving about in empty space according to specific laws of motion (gravity). It was these laws that Newton tried to formulate. It is important to realise that a commonsense notion of the universe — which incorporates such concepts as space, matter, motion, bodies — was not articulated until around 1600, and constituted an important theoretical advance in our understanding of nature.

But Newton was not an atheist; God had an important role to play in his schema, for Newton saw divinity as an omnipotent and omniscient being both creating and governing the world. God was the “creator of all things”. As he put it:

“the motions which the planets now have could not spring from any natural course alone, but were impressed by an intelligent Agent”.

Newton's mechanistic view of the world was shared by many earlier seventeenth century philosophers, Bacon, Descartes, Hobbes in particular. Black Elk and Plato saw the natural world as a living entity; these philosophers saw it as a machine. Both were analogical conceptions, and both derived from the social and historical circumstances of the respective theorists.

The mechanistic conception of nature was associated and consonant with, certain other attitudes: *Firstly* it implied, if the expression be allowed, that God had been kicked out of the universe or as Diderot put it, “Men have banished divinity from their midst; they have relegated it to a sanctuary”. The Christian view of a God, standing outside the world as an omnipotent creator became the prominent idea; as Collingwood suggests, the relation of God to Nature was like that of a clockmaker to a clock — not that of a potter, as implied in Ovid's account of creation, for God had made the pots too. Thus natural philosophy was the attempt at understanding the workings of nature; divine philosophy or theology, was devoted to knowledge concerning God. In the next century, of course, the philosophers of the Enlightenment like Diderot and D'Holbach took a further step and dispensed with the idea of god altogether, retaining a purely



Sir Isaac Newton: 'A kind of super-mechanic using mathematical theorem to discover the workings of the natural world'?

mechanistic conception of nature. But even at the time many Christians did not see much difference between theists and atheists.

*Secondly*, in tune with the kind of social relationships that the capitalist economy was generating, nature itself came to be seen as a kind of commodity or utility; or in modern terms, a resource to be exploited.

*Thirdly* man's relation to the world came to take the form of an opposition, and particularly in the writings of Francis Bacon, the notion of “man against nature” came to have salience. In fact a whole series of oppositions or dichotomies sprang from this mechanistic philosophy. If nature was a kind of machine created by god where did humans fit into the picture. Descartes' answer was to suggest a dualistic reality consisting of two self-contained systems body and mind — “the ghost in the machine”. Another opposition which was articulated,

and which emerged in the writings of Hobbes with particular clarity, was that between the individual and society.

Hobbes classic study *Leviathan*, known to all students of politics, is well known as an impassioned defence of political absolutism. But what is equally interesting about this study is that Hobbes conceives of mankind as a purely *natural* being, and society as an artifact. Man, he held, was simply a natural machine, driven by two powerful emotions, the desire for power, and for self-preservation. In a state of nature, there is a “war of everyone against everyone”, and thus, in his well known phrase “the life of man, solitary, poor, nasty, brutish and short”. Natural man, for Hobbes, was egoistic, competitive, aggressive, power-seeking. And civil society, as the state, was the means whereby, through agreement, social order and civility were maintained. A mechanistic conception of man, and a fundamental opposition between the individual and society

are the essential premises underlying this important work.

*Fourthly:* this mechanistic conception of the universe, and the associated "man against nature" postulate were consonant not only with the idea of a transcendental creator, but also with Christian premises regarding man's relation to divinity. Indeed some writers have argued that the Baconian creed, implying that man is not a part but an exploiter of nature springs from the Judeo-Christian tradition itself. And in this context it is worth quoting a relevant extract from Genesis:

'Then God said, "Let us make man in our image and likeness, to rule the fish in the sea, the birds in the heavens, the cattle and all the wild animals on earth." So God created man in his own image. Male and female he created. God blessed them and said to them "Be fruitful and increase, fill the earth and subdue it.'

Similar sentiments are expressed in the Koran, where man is given the earth to inherit, as well as being given dominion over all of God's creation. There is indeed a significant passage in the *Sura*, 'The Cow', in which the Angels query God's decision to place man as his "substitute" on earth. They ask; "Will thou place there one who will do evil therein and shed blood?", but God indicates to them that he alone knows all the secrets of heaven and earth, and that they should pay homage to Adam. You can see a very different symbolism here to that portrayed in "Black Elk Speaks". In the cosmological attitude to nature, the relationship of man to nature is one of kinship or affinity. The sentiments expressed in the Bible indicate a separation and a political relation between man and nature — humans are linked directly to God, and have divine sanction to rule, or subdue nature. What is interesting about Francis Bacon is that he took this Biblical injunction seriously, and on the title page of the second book of his *Novum Organum* (New Logic) he tells us that his aim is not only to understand nature but to give man dominion over it; indeed in an important sense Bacon equated knowledge and power. There is with Bacon, as with Newton, a creative

dimension or aspect to his philosophy, and Bacon was well aware that from the "fountain" of mechanical knowledge "instruments of death" might equally well emerge, but on the whole the legacy of these seventeenth century philosophers was a rather mixed blessing. On the one hand they pioneered a naturalistic outlook towards the world (and this was important and progressive); but this was coupled with an attitude suggesting an opposition between man and nature, and that it was man's destiny to subdue, control, and exploit the world as if mankind owned it.

Mankind was God's chosen creature. Thus the idea one is given that Newtonian physics made man feel insignificant is quite wrong; it gave him the feeling that his powers were unlimited. No wonder the angels complained.

*Fifthly:* this mechanistic philosophy harmonized well with the expanding capitalist system, and with the fact, that in the centuries that followed, European peoples began to either colonize or to assert political dominance and exploit large areas of the world. The mechanistic attitude to nature, therefore was embraced and articulated with emphasis and clarity by puritans, pioneers, explorers and colonists who moved into these new terrains. The literature of the eighteenth and nineteenth centuries is replete with examples of this new conception of nature — the idea that nature is an entity antagonistic to man, and which therefore has to be subdued, conquered and controlled (along with the pre-industrial peoples who were associated with the frontier). I need hardly quote from such works, but I will mention one, Samuel Baker's memoir *Wild Beasts and their Ways* published in 1890. Samuel Baker was a famous explorer; in fact Alan Moorehead described him as the most professional explorer ever to set foot in Africa; but he was also an ardent big-game hunter. His book is full of good natural history — but a Hobbesian mechanistic attitude towards the natural world permeates every page. The first chapter is devoted to "guns", while the final chapter, where he describes nature as a "system of terrorism"

ends with these words:

"No more trusty companion . . . can be found than a double-barrelled rifle . . . this professional adviser will confirm him in the theory that "the law of force will always govern the world."

It's interesting this. The gun not nature is personified; and the natural world is conceptualized entirely within the terms of struggle, conflict and power.

### Kipling: Exploring the Dilemma

A more interesting example of this dichotomy between man and nature, is contained in Rudyard Kipling's classic tale *The Jungle Book*. Kipling was an imperialist in sentiment, and in politics — but he was also an extremely able and sensitive writer, and he portrays better than anyone by means of a fairy tale (based on Indian folk stories) the dilemma involved in making an opposition between man and nature. I will quote a short extract from *Mowgli's Song*, the song the boy sings to the jungle folk after killing Shere Khan, the tiger.

"Waters of the Waingunga, the Man Pack have cast me out. I did them no harm, but they were afraid of me. Why?

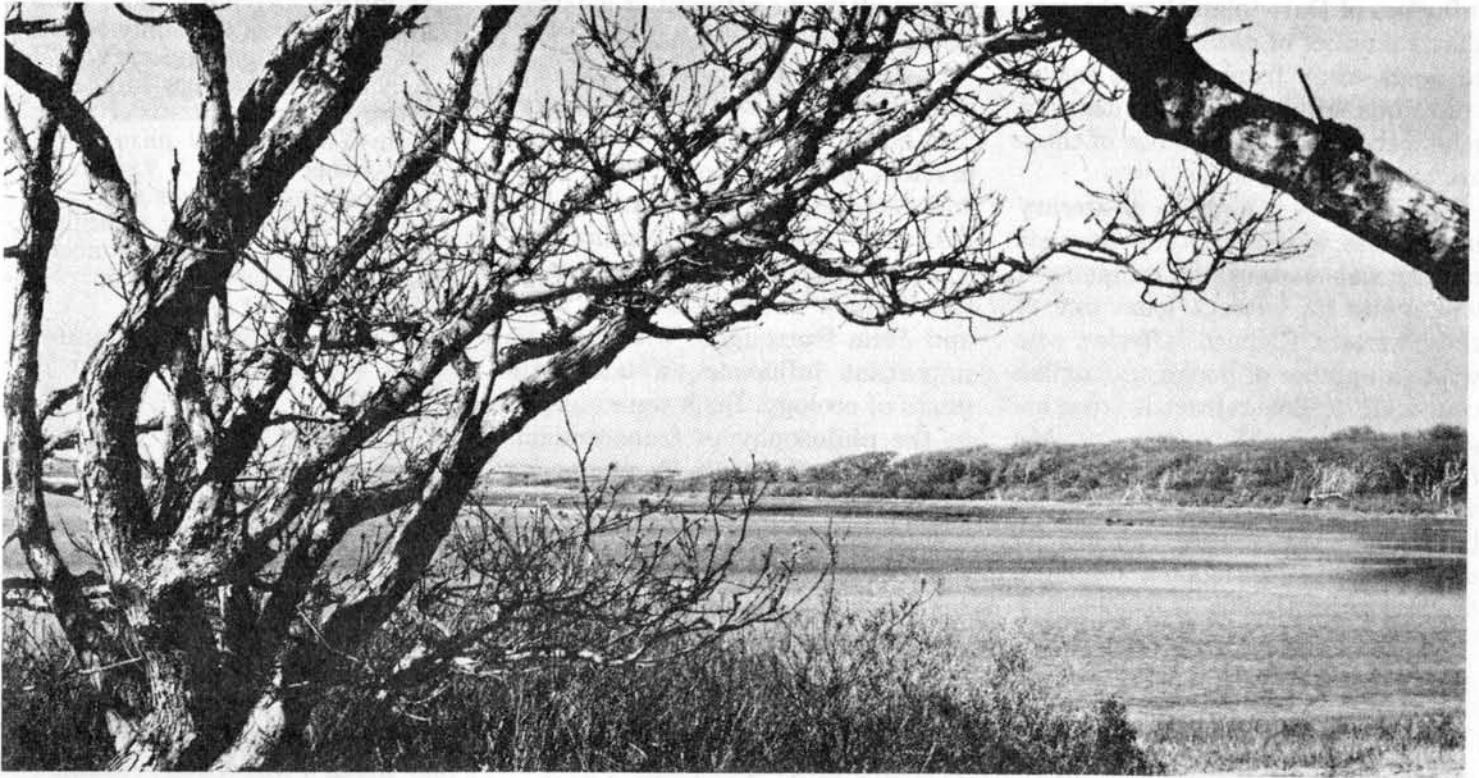
Wolf Pack, ye have cast me out too. The jungle is shut to me and the village gates are shut. Why?

As Mang flies between the beasts and the birds, so fly I between the village and the jungle. Why?

Why?

You can see here that Kipling is describing two separate and antagonistic domains; the village, the domain of men and the jungle, the world of animals, which has its own laws. But Mowgli (unlike Tarzan) is not Lord of the Jungle, but is trying to mediate the opposition. He belongs to the world of humans and when he cries, this proves to Bagheera that he is indeed a human being. But he is not sure about this; he is not certain that the village contains "his own people". It is in the jungle that he finds companionship and his brothers the wolves — yet the jungle is "shut" to him. So it's not surprising that the boy sings that there are "two Mowglis" and that his song ends with the words:





Inspired by the staggering beauty of America's native wilderness, many early American writers rejected the Baconian view that man held dominion over nature: their subsequent works heralded the birth of the environmental movement.

"My heart is heavy with the things that I do not understand".

It is clear that in *The Jungle Book* Kipling is grappling with the problems and dilemmas which the Baconian doctrine of "man against nature" generates. Is man a part of nature? Have men any right to go around wantonly killing things? Or to claim dominion of the earth? In fact Kipling is but articulating through the media of a fairy tale, the thoughts and feelings of his generation: throughout the latter part of the nineteenth century, writers and scholars were beginning to question the viability of the mechanistic conception of nature — both on moral and on conceptual grounds. Physicists were beginning to see that Newtonian mechanical theory was no key at all in understanding the nature of such things as light and by degrees the mechanistic conception of nature was replaced by the idea that nature was best understood as a kind of "process", or as Whitehead put it, the change involved "the transition from space and matter as the fundamental notions to process as a complex of activity".

#### Darwinism: Man in Nature

In historical and sociological

studies, which were then emerging as independent disciplines, social life was essentially portrayed as a changing entity, or process, in which the dichotomy between the individual and society hardly made sense; writers like Marx and Durkheim stressed that the essential nature of man implied his sociality. Also important was the fact that throughout the nineteenth century writers and artists expressed a reaction — known as the romantic movement — against mechanism in all its forms.

But perhaps the most fundamental undermining of the mechanistic conception of nature came from biology and the rise of evolutionary theory. The theory itself had long been in the air, but it was the publication of Charles Darwin's *Origin of Species* in 1859 that gave the theory intellectual standing and respectability for Darwin stressed that there was an intrinsic relationship between an organism and its environment, and thus highlighted what he thought was the mechanism of evolutionary change, namely natural selection. Darwin therefore firmly placed man in nature, and his disciple Thomas Huxley wrote an essay with the significant title 'Man's Place in Nature'. But more important than

this, Darwin restored the idea of a totality; for his theory implied that man was *part* of a complex biotic system, and that the physical and biological realms of nature were interdependent. This new conception of nature is best described as *ecological*, and there is no doubt that Darwin was a prime instigator of this new way of looking at things. This movement of thought had both an ethical and a theoretical dimension, but if one asks who started this movement of thought it is very difficult to give a precise answer.

The term 'ecology' itself was coined by an influential German biologist Ernst Haeckel in 1870, and the word is derived from the Greek *Oikos* meaning house or home, implying that the natural world is a place one lives in, rather than a machine one tries to control. But it was not until the 1930s that ecology emerged as an identifiable academic study.

#### The Ecological View: Seton and Jeffries

If one tries to understand the rise of this new conception of nature one is therefore forced to look outside academia. For essentially what happened towards the end of the nineteenth century, under the

influence of Darwinian thought, was that a number of naturalists started to break away from the two earlier traditions. Most of these writers are relatively unknown, and few of them are read nowadays.

Firstly there is a group of literary naturalists whose attitude towards nature was essentially religious. I will quote an extract from one of these writers, Richard Jefferies, who wrote a number of books on English country life. The extract is from his autobiography, *The Story of My Heart*, published when he was 34 years old, and some four years before he died of tuberculosis. He describes his feelings on climbing the Wiltshire Downs as follows:

"I was utterly alone with the sun and the earth. Lying down on the grass, I spoke in my soul to the earth, the sun, the air, and the distant sea far beyond. I thought of the earth's firmness — I felt it bear me up; through the grassy couch there came an influence as if I could feel the great earth speaking to me. I thought of the wandering air . . . the air touched me and gave me something of itself. I spoke to the sea. I desired to have its strength, its mystery and glory. Then I addressed the sun, desiring the soul equivalence of his light and brilliance".

And he goes on;

"The air, the sunlight, the night, all that surrounds me seems crowded with inexpressible powers, with the influence of souls or existences, so that I walk in the midst of immortal things."

You will recognize in this extract, echoes of Black Elk, for Jefferies felt a mystical attachment towards the natural world. His attitude towards nature was almost religious. Yet he was an atheist and was reviled for his pantheistic leanings; moreover his mysticism was combined with an almost Baconian stress on the need for careful and close observation. Jefferies's books are simply full of detailed and accurate — essentially scientific — descriptions of nature and country life. There's nothing like this in Black Elk. Jefferies combines the feelings and sentiments implied by the cosmological or sacred vision of nature, with the scientific stance of mechanistic philosophy, devoid of its pretensions

regarding man's attempt at mastery of the world.

There were other writers of the same genre, one of the most important being W.H. Hudson, who, in his precious autobiography, *Far Away and Long Ago*, significantly called his own philosophy "animism". Their counterparts in America were the literary naturalists John Muir and John Burroughs, who were an important influence on later students of ecology. Both were steeped in the philosophy of transcendentalism, springing from Emerson — a philosophy that saw nature as a metaphor for god. And yet both combined, like Jefferies, this religious outlook with a scientific rationalism.

Secondly, there emerged a group of writers who were steeped in the American frontier spirit, that is to say, essentially they had imbibed, as youths, the Baconian or Promethean creed, that saw human creativity only in terms of man's "empire over the universe" (to quote from Bacon) — but reacted against it. In other words they started out like Samuel Baker, with a genuine interest in nature and the outdoor life but only as this was perceived in the context of power relations; and for various reasons, they abandoned the negative aspect. There is no better illustration of this than Ernest Thompson Seton's poignant tale *Trail of the Sandhill Stag*. The story is of a long hunt in the Manitoba sandhills — and is largely autobiographical. It is a story full of good natural history, and the climax of the tale is as follows:

"A twig ticked in the copse. Yan slowly rose with nerve and sense at tightest tense, the gun in line — and as he rose, there also rose, but fifteen feet away, a wondrous pair . . . of horns . . . and face to face they stood. Yan and the Sandhill stag. At last — at last, his life was in Yan's hands. The stag flinched not, but stood and gazed . . . and the rifle leaped but sank.

Shoot, shoot, shoot now. This is what you have toiled for, said a faint and fading voice.

But Yan remembered that night when the snow was red with crime, and now between him and the other there he dimly saw a vision of an

agonizing, dying doe, with great sad eyes, that only asked "What harm have I done you?" A change came over him, and every thought of murder went from Yan as they gazed into each other's eyes . . . Yan could not look into his eyes and take his life, and different thoughts and a wholly different concept of the stag . . . had come.

Oh beautiful creature . . . We have long stood as foes, hunter and hunted, but now that is changed . . . We are brothers, Oh, bounding Blacktail! Go now, without fear, to range the piney hills; never more shall I follow your trail with the wild wolf rampant in my heart . . . I have learned what the Buddha learned".

Seton was a brilliant naturalist, and he had spent his youth in the plains of Manitoba, when it was still very much a wilderness. And he had imbibed the pioneer spirit. But he was also an artist, and had a passionate interest in American-Indian culture — and this countered and tempered the pioneering and the hunter attitude towards nature. Thus Seton came in his realistic stories of animal life — the first of their kind — to depict an ecological perspective towards nature. He did not focus on animals in a kind of primitive state — as did that other fine nature-writer Charles G. D. Roberts — but rather on the inter-relationship between man and animals, but unlike the earlier hunting tales our sympathies are drawn wholly towards the animals. There were several other naturalists that represent this kind of tradition — and three are worth mentioning, Grey Owl, William T. Hornaday, who founded the Bison Society, and George Bird Grinnell. Grinnell, like Seton, is a figure few people have ever heard of, yet he did stalwart work in nature conservation. He was a brilliant anthropologist, and wrote some classic studies of the Cheyenne Indians; he was the founder of the Audubon Society, and was, for many years, editor of the important American magazine for sportsmen *Forest and Stream*. It is quite interesting to note in this context that the impetus for nature conservation found one of its earliest expressions through sportsmen's associations.



## Conclusion

Thus if we seek the origins of the ecological orientation towards nature, we can but suggest that it was a rather inchoate movement, stemming from Darwin, that found its expression in the life and work of some late nineteenth century naturalists — like Muir, Seton, Grinnell and Jefferies. Although it represented a break-away from the mechanistic conception in theory, its main impetus was *ethical*, and it sprang from the realization that the Baconian attitude towards nature could only have one logical result, that mankind in his efforts to subdue and explain nature might very easily end-up, in destroying himself. It was left to a later generation, many of them taking their inspiration from those earlier writers, to establish ecology on a scientific basis, and here the work of Olaus Murie, Arthur Tansley, Charles Elton and Aldo Leopold — all serious and painstaking biologists — are important.

At the present time all three attitudes towards nature are in evidence, but sadly it is the mechanistic perspective that is still dominant in western culture. Francis Bacon was justly described as the philosopher of industrial science — and it is the proponents of industrial science whose views seem to take prominence these days in all major decisions. And equally sad, even those who protest against the anti-life and mechanistic tendencies evident in the contemporary world, seem all too easily to take a retrograde step, and to advocate not an *ecological* but a cosmological viewpoint. So they appeal to St. Francis, to Buddha, or to Black Elk as exemplars of a radical philosophy with which to counteract the Baconian creed. But these figures articulate a philosophy that Newtonian science long ago destroyed: we need to advocate and reassert the unity of man and nature, but this can be done without recourse to a divinity.

May I end this essay with words of Spinoza:

"Smile not, lament not, nor condemn; but understand".

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# TMI: How Many Will the Clean Up Kill?

by

Joan Harvey, Richard Piccioni, and Daniel Pisello

Two years after its near catastrophic accident, Met-Edison's Three Mile Island nuclear reactor is still a radioactive hulk. The authorities claim that the plant can be cleaned-up without endangering the general public. Independent monitoring by the authors of radioactive releases to date, however, presents a somewhat different picture . . .

The proposed clean-up at the Three Mile Island Unit 2 nuclear plant (TMI) is potentially lethal to a large percentage of the population of the United States. The United States Nuclear Regulatory Commission, together with the utility, Met Edison, and the United States Environmental Protection Agency carefully underestimate the real damage to public health in a major agricultural area of the United States, and consistently underestimate the probability of catastrophic accidents resulting from existing core and structural damage in the reactor.

The Programmatic Environmental Impact Statement NUREG-0683<sup>1</sup> (PEIS) gives no indication at all of the harm that will be done to the health of the public as a result of the proposed clean-up of TMI. The PEIS specifically underestimates the quantity of toxic radionuclides that will be released to the environment in the various phases of the proposed clean-up. A false impression is created by the NRC that public health is

protected by diluting and regulating the releases so as not to exceed certain maximum permissible concentrations set by federal law and thereby limiting the maximum dose per year to any single individual. In fact, the total number of induced cancer fatalities is determined by the total population dose which depends only on the total amount of radioactivity released, not on the rate at which it is released. The dose response factor (the induced cancer fatalities per person-rem) used in the PEIS is too small by a factor of about 200 or more. The possible accidents considered in the PEIS do not incorporate the real possibility of structural damage and the core condition which, taken into account, make the possible accidents both more numerous and more lethal than discussed in NUREG-0683. No attention was given to the special dangers associated with the large quantities of zirconium hydride formed in the core, when the hydrogen bubble was present in the reactor vessel. Finally, the moni-



toring program described in the PEIS is totally inadequate for detecting the release of significant quantities of radioactive toxins during clean-up.

### Potential Dangers from Radionuclides

Table 1 gives the total inventory of the TMI-Unit 2 reactor, as of July 31, 1980, for radionuclides with significant activity. For reference purposes we include the adult whole body dose conversion factor for ingestion and inhalation in rems per curie<sup>2,3</sup> and the potential population dose in person-rems to the whole body for each radionuclide present. In this way we can see at a glance which radionuclides have the greatest potential for harm. It should be noted that the dose conversion factors are higher for children and infants, resulting in larger potential doses to these age groups. For example, the whole body dose conversion factor for ingestion of strontium-90 is  $1.86 \times 10^6$  rems per curie for adults and  $4.71 \times 10^6$  for infants — two and a half times greater. According to these figures the worst potential threats are strontium-90 ( $1.5 \times 10^{12}$  person-rems to the whole body from ingestion) and plutonium-239 and 240 ( $1.26 \times 10^{12}$  person-rems to the whole body from inhalation). Other isotopes having large potential population doses are the cesiums, cobalt-60, ruthenium-106, antimony-125, nickel-63, americium-241, and iron-55.

One means whereby these toxic materials might be released into the environment is by destroying the integrity of the Zircaloy fuel cladding of the fuel rods. This was done in the metal-water reaction that occurred in the reactor vessel resulting in the production of large amounts of hydrogen gas. According to NRC estimates 40 per cent of the cladding was destroyed in this reaction. The combination of the produced hydrogen with unoxidized zirconium formed zirconium hydride destroying an additional 20 per cent of the cladding. (For a fuller discussion of this point see "The Zirconium Connection", *The Ecologist*, May 1979).

### The Inventory of Radioactive Material

Because of the destruction of the cladding most of the gaseous fission products have escaped from the core and the entire inventory of radionuclides in the spent fuel can be leached by the primary coolant water, which has been leaking from the primary coolant system since the beginning of the accident. There are approximately 300,000 gallons of water in the Auxilliary and Fuel Handling Building (AFHB), 700,000 gallons in the reactor building sump, and 96,000 gallons in the primary coolant system. Table II gives the amounts of the principal radionuclides present in the water as dissolved and suspended material and as sludge. This adds up to a total of 619,000 curies representing a potential dose of 84 billion person-rems. To this must be added the radioactivity that will be scrubbed from walls and surfaces in the decontamination of the AFHB and the reactor building, as well as the material that will be leached out of the core during the decontamination and flush of the primary coolant system. This may result in an additional 300,000 curies of cesium-137 becoming dissolved, as well as unpredicted amounts of other substances.

There is, for example, still in the core about 770,000 curies of strontium-90. If one tenth of this leached out during the flush of the core, that would add another 77,000 curies of strontium-90 representing an additional potential population dose of  $1.4 \times 10^{11}$  person-rems. Thus the total dissolved activity could easily reach nearly one million curies representing a total potential dose of  $2.5 \times 10^{11}$  or 250 billion person-rems.

### NRC Estimates of Contamination

All contaminated water is to be treated with one or another of the proposed decontamination systems that involve filters, and either inorganic (zeolite) or organic (resin) ion exchange media. According to NUREG-0683 these system will have an overall decontamination factor of about  $10^{-5}$ . Thus the final product will be water containing approximately one curie of strontium-90 and nine curies of cesium 134 and 137 (10 curies in  $10^6$  gallons = .003 microcuries per milliliter) representing a total potential dose of 2.5 million person-rems. If this was discharged into the Susquehanna River when the flow rate was 5000 cubic feet per second or 3.2 billion gallons per day, and water was taken for Lancaster at 8 million gallons per day, for the borough of Columbia at 2 million gallons per day, and for the city of Baltimore at 250 million gallons per day, then 260 million gallons per day or 8 per cent of the river would be taken into municipal water supplies, and 8 per cent of the released strontium and cesium would also be taken in. If only 1 per cent of this amount were eventually ingested, this would result in a total population dose of 2000 person-rems to the people of these municipalities or to people who consumed food products produced with water from these supplies. It is important to point out how sensitive this calculation is to the assumed amount of strontium-90 that will be leached out of the core during primary coolant flush or any other phase of the clean-up for that matter. A leaching rate of 20 per cent instead of 10 per cent for strontium-90 would raise the population dose to 3120 person-rems. Also, we have not included the effect of other radionuclides beside strontium and cesium.

### Airborne Releases

In calculating airborne release occurring during water treatment, NUREG-0683 uses the figure .01 per cent of the total activity processed to find the amount that becomes airborne. This figure is "based on experience with a more complex chemical operation associated with fuel processing." It is important to note that this value is quite arbitrary and is applied indiscriminately to a wide variety of operations involved in the clean-up. However, on the basis of this value we can expect a total of 100 curies to become airborne during the clean-up of the water. If the HEPA filters function perfectly for the entire time, then NUREG-0683 recommends the penetration factor  $9 \times 10^{-8}$  for the filters. Applying this factor one predicts 9 microcuries will be released to the air. However, if one takes NRC figures, then one can predict 1 curie of strontium and cesium will be released to the air during the water clean-up without any accidents. This represents a total dose of

$2.75 \times 10^5$  person-rem. If we consider that 40 per cent of the land area in Dauphin, Lancaster and York counties is cropland and assume 100 per cent deposition and an annual uptake of 1 per cent of the decayed isotopes we calculate that a total population dose of  $1.6 \times 10^4$  person-rem will eventually be delivered to the people eating food from this area.

According to NUREG-0683, solidification or immobilization of the filters and resin beds resulting from water treatment will also yield airborne radioactivity amounting to .01 per cent of the total activity processed. Thus the predictions of the preceding paragraph are simply doubled. Therefore the chief consequence of processing the radioactive water will be the release of possibly 2 curies of radioactive airborne particulate, mostly strontium-90 and cesium-137 and 134, which will settle on the farmland in the area causing a maximum population dose of 32 thousand person-rem. This is in addition to the dose to citizens downstream from release of the processed water, which was calculated to be 2000 person-rem, not including the incorporation of the radionuclides into the food chain in fish.

#### What if an Accident Occurs?

Much larger releases with correspondingly more tragic consequences can result from accidents involving, for example, fires which destroy air filters, and fires which may involve spent resin beds or spent fuel. In this respect, we must add our warning to the warning comment of Professor Earl Gulbransen of the University of Pittsburgh concerning the particular dangers associated with the presence inside the reactor vessel of substantial quantities, perhaps four tons, of zirconium hydride, and unreacted zirconium. This material is present in the reactor vessel partly in the form of fine needles. It is capable of reacting with water explosively releasing hydrogen with a pressure of  $10^{10}$  atmospheres. Zirconium and zirconium hydride also burn very hot in air and in the finely divided state they may ignite spontaneously. These problems were discussed in an NRC memorandum<sup>4</sup> from Kris I. Parczewski of the Reactor Safety Branch. The memorandum duly notes the problems:

In contact with water at lower pressures hydrogen gas can be released . . . Zirconium hydride in powdery form is pyrophoric and when exposed to air may ignite and produce violent reaction. The information from other sources shows that the auto-ignition temperature of zirconium hydride is  $270^\circ$  in air. It is, however, very much dependent on the physical form of the hydride.

The memorandum concludes with the recommendation to take the warning seriously and take the following precautions:

- (1) To monitor the presence of hydrogen in the primary coolant in order to establish if the decomposition of zirconium hydride takes place.
- (2) When opening the reactor vessel for cleaning assure that the debris at the bottom of the vessel are not exposed to the oxidizing environment (e.g. dry air)

Although NRC staff is aware enough of this problem

to discuss its dangers in internal NRC memos, no mention is made of it anywhere in the PEIS.

#### Dose-Response: How many Cancer Deaths?

Next we take up the question of the dose-response parameters used in the PEIS. These are the factors used to convert population dose to predicted health effects, i.e. cancer fatalities, or individual dose to cancer risk. The numbers used in the PEIS are taken from the National Academy of Sciences, Advisory Committee on the Biological Effects of Ionizing Radiation (BEIR) report, published in November 1972<sup>5</sup>, and consistently underestimate the effects of ionizing radiation by a factor of 200 or more. Irwin Bross, a statistician at the Rosewell Park Memorial Hospital in Upstate New York, recently analyzed the question of dose response in light of the most recent epidemiological studies and arrives at a figure of 5 rem for the doubling dose for leukemia and somewhat higher value for solid cancers<sup>6</sup>. In their study of radiation workers exposed to low levels of ionizing radiation over long periods of time, Thomas Mancuso and his co-workers<sup>7</sup> find doubling doses of 34 rem and 9 rem for all forms of cancer in adult males and females respectively. For the purpose of calculating cancer fatalities caused by the proposed clean-up operations we will use a figure of 10 rem for the doubling dose and a cancer fatality rate of 28 per cent for the exposed population<sup>8</sup>. On this basis a population dose of 1000 person-rem distributes 100 doubling doses among the exposed population and is equivalent, according to the widely accepted linear hypothesis, to doubling the risk of cancer fatality for 100 individuals, resulting in 28 additional cancer deaths. Thus, the 32,000 person-rem that will be delivered to people as a result of the predicted releases of airborne radioactivity associated with the proposed water treatment will cause 900 additional cancer deaths. (Assuming the more optimistic filter efficiency of  $3 \times 10^{-4}$ , one predicts 27 additional cancer deaths from releases to the air in the treatment of water.) As was shown above, the release of the treated water into the Susquehanna River will result in a population dose of 2000 person-rem, causing 56 excess cancer fatalities among people living downriver.

Children, infants and the unborn are much more vulnerable to radiation. The doubling dose for the unborn for example is one rem or less as determined by Stewart and co-workers<sup>9</sup>. Thus, the predicted number of cancer deaths calculated above should be multiplied by a factor of 5 if one considers an affected population made up primarily of children, infants and the unborn. The entire clean-up could lead to as many as 4,500 cancer deaths. The maximum dose to workers involved in the clean-up is given as 30,000 person-rem in NUREG-0683. This is equivalent to 3000 doubling doses or 840 additional cancer deaths among the workers.

#### Monitoring: the Disturbing Truth

In the summer of 1980 during the two-week venting period at TMI, Accord Research and Educational Associates performed round-the-clock monitoring of radiation levels. Air particulate samples were collected



**TABLE 1. Radionuclide inventory of TMI-2 on July 31, 1980**

nuclide	half-life (years)	inventory (curies)	ingestion	potential population dose (person-rems)	inhalation	potential population dose (person-rems)
			dose conversion factor (rems/curie)		dose conversion factor (rems/curie)	
H-3	12.3	3,800	$1.26 \times 10^2$	$4.8 \times 10^5$	$1.26 \times 10^2$	$4.8 \times 10^5$
Fe-55	2.7	29,000	$4.43 \times 10^2$	$1.1 \times 10^7$	$4.93 \times 10^2$	$1.43 \times 10^7$
Co-60	5.3	300,000	$4.72 \times 10^3$	$1.4 \times 10^9$	$1.85 \times 10^3$	$5.6 \times 10^8$
Ni-63	100.	10,000	$4.36 \times 10^3$	$4.4 \times 10^7$	$1.81 \times 10^3$	$1.81 \times 10^7$
Sr-90	28.1	790,000	$1.86 \times 10^6$	$1.5 \times 10^{12}$	$7.62 \times 10^5$	$6.0 \times 10^{11}$
Sr-89	.14	90,000	$8.84 \times 10^3$	$7.9 \times 10^8$	$1.09 \times 10^3$	$9.8 \times 10^7$
Ru-106	1.	1,300,000	$3.48 \times 10^2$	$4.5 \times 10^8$	$1.09 \times 10^3$	$1.4 \times 10^9$
Sb-125	2.7	42,000	$4.05 \times 10^2$	$1.6 \times 10^4$	$3.65 \times 10^3$	$1.5 \times 10^8$
Cs-134	2.1	220,000	$1.21 \times 10^5$	$2.6 \times 10^{10}$	$9.10 \times 10^4$	$2.0 \times 10^{10}$
Cs-137	30.	880,000	$7.14 \times 10^4$	$6.3 \times 10^{10}$	$5.35 \times 10^4$	$4.7 \times 10^{10}$
U-235	$7 \times 10^8$	3.3	$4.86 \times 10^2$	$1.6 \times 10^3$	$1.21 \times 10^6$	$4. \times 10^6$
U-236	$2.3 \times 10^7$	4.1	$4.96 \times 10^2$	$2.0 \times 10^3$	$1.24 \times 10^6$	$5. \times 10^6$
Np-237	$2.1 \times 10^6$	1	$5.57 \times 10^4$	$5.57 \times 10^4$	$1.39 \times 10^8$	$1.4 \times 10^8$
U-238	$4.5 \times 10^9$	18	$4.5 \times 10^2$	$8.1 \times 10^3$	$1.1 \times 10^6$	$2. \times 10^7$
Pu-239	24,390	7,900	$6.4 \times 10^4$	$5. \times 10^8$	$1.6 \times 10^8$	$1.3 \times 10^{12}$
Pu-240	6,537	2,200	$6.39 \times 10^4$	$1.4 \times 10^8$	$1.59 \times 10^8$	$.3 \times 10^{12}$
Am-241	433	220	$5.46 \times 10^4$	$1.2 \times 10^7$	$1.36 \times 10^8$	$.03 \times 10^{12}$

and the krypton-85 activity in the plume from TMI II was measured. Radiochemical measurement of the particulate samples showed levels of strontium-90 in the air at least nine times greater than the maximum expected from the residue of bomb tests. As a result of our measurement we calculated that 7 millicuries of strontium-90 and an estimated 20 millicuries of cesium-137 were released in the venting to the surrounding farmlands. We predict the venting will result in at least 20 cancer deaths mostly from ingestion of strontium-90.

This short venting period allowed us to formulate a precedent. The amount of strontium-90 found by AREA's monitoring is at least 800 times greater than the prediction of Metropolitan Edison and the NRC. The NRC's estimates of releases in this "minor venting" were calculated to be as inaccurate and of "no significance" as are the other estimates in NUREG-0683.

Of the six state and federal agencies involved in monitoring radioactive air particulates and milk contamination during the clean-up of TMI, only two even attempt to detect strontium-90, a pure beta emitter. Only the licensee, Met-Edison, attempts to measure strontium-90 more frequently than four times a year. As pointed out above, this isotope represents the single greatest source of harm to human beings of any nuclide in the reactor.

### Conclusion

In summary, the total quantity of lethal and toxic radionuclides that must be released to the air and water in the proposed clean-up of the damaged TMI Unit-2, either over time or in any single phase of the clean-up, is much greater than estimated by NUREG-0683. The NRC insists repeatedly that public health is protected by diluting and/or regulating releases to keep below certain maximum permissible concentrations set by them and enacted into federal law. These laws apparently limit the maximum dose per year to any single individual. However, an individual is only aided by such manipulation of releases over time,

**TABLE II. Radionuclides in water (curies)**

	H-3	Cs-137	Cs-134	Sr-90	Sr-89
<b>AFHB:</b>					
Dissolved	190	33,000	5,600	520	124
Suspended	—	12,600	2,500	741	400
Sludge	—	9,000	1,800	2,600	1,600
<b>REACTOR BUILDING:</b>					
<b>Sump Water</b>					
Dissolved	2,500	440,000	75,000	7,000	1,600
Suspended		9.4	1.7	20	10
<b>PRIMARY WATER SYSTEM:</b>					
Dissolved	58	14,000	2,400	9,500	3,000
<b>TOTAL IN WATER:</b>	<b>2,748</b>	<b>508,609</b>	<b>87,300</b>	<b>20,381</b>	<b>6,734</b>

if he is lucky enough to die of other causes before the next such planned release. In fact, the total number of additional cancer fatalities, illnesses, and genetic mutations depends only on the *total* amount of radioactivity released which determines the total population dose. The *rate* at which these releases are made is not a factor in the total number of additional cancers. Also, the induced cancer fatalities per person-rem used in the PEIS is too small by at least a factor of 200.

It has been determined by the NRC that 40 per cent of the cladding of the fuel rods has been destroyed, making all of the radionuclides in the spent fuel available to leaching by primary coolant water. The primary coolant system has been leaking primary coolant water since the beginning of the accident, and the water continues to leak today according to the PEIS. The total amount of principal radionuclides now present in the water, either dissolved, suspended or as sludge, is 619,000 curies, or 84 billion person-rems. Waterborne radioactivity will increase during the clean-up by as much as 300,000 curies or more. The treatment of contaminated water will reduce the contamination to an "acceptable" but alarming quantity of radionuclides that will be released into the Susquehanna and taken up in drinking water. The final product figured here using the NUREG-0683 decontamination factor of about  $10^{-5}$ , will be water containing approximately one curie of strontium-90

and 9 curies of cesium 137 and 134 (10 curies in 10<sup>6</sup> gallons = .003 microcuries per milliliter) representing a total potential population dose of 2.5 million person-rems. Air releases are also greater than proposed in the PEIS. The radioactive poison released to the air and water during the TMI clean-up will enter the food chain and have a harmful effect on the next five to ten generations of people who eat food produced in the surrounding Pennsylvania farmlands or fish from the Susquehanna River below TMI.

Enormous possible dangers are associated with the existence of large quantities of zirconium hydride, originally formed in the core when the hydrogen bubble was present in the reactor vessel. This existing core damage has created an unstable and dangerous condition and must not be considered a predictable factor in the clean-up operation. The interaction of clean-up technologies with the core's unstable condition might be of catastrophic proportions.

Releases from accidents due to zirconium fires and other hazardous and flammable materials, such as spent resins, spent fuel, etc., would be of enormous proportions. For example, calculations show that a fire involving only 1 per cent of the spent resin beds could lead to millions of deaths from inhalation and ingestion of dispersed strontium-90 and other radionuclides. Direct gamma radiation from cesium-137 released from such a fire would be roughly equivalent to the radiation from the fallout of a one megaton nuclear bomb. Zirconium fires involving spent fuel would release long-lived alpha-emitting plutonium, and americium, as well as strontium, cesium and all the other radionuclides. This would cause immediate death to tens of thousands of people and contaminate the land for hundreds of thousands of years.

In addition to ignoring a major hazard — namely, the ignition of the zirconium hydride cladding — the NRC carries out four key deceptions in assessing risk. First, the value assumed for the fraction of the processed radioactivity that is expected to become airborne in the clean-up is speculative and not based on experience with the operations proposed. Second, the efficiency of air filtration assumed in the PEIS exceeds the NRC's own maximum dependable value. Third, the radiation dose/effect relation employed by the NRC to estimate the effects of exposing large numbers of people to relatively low rates of irradiation is based on effects observed at high irradiation rates. Health effects are underestimated by two orders of magnitude. Most significant, however, is the totally false assumption that distributing the release of a given curie amount of radioactivity over an extended period of time or over a wider geographical area in any way lessens its ultimate biological effect. In fact, because of the irradiation-rate phenomenon just mentioned, a fixed amount of radioactivity is likely to deliver an increased effect when a larger population is exposed at a reduced rate over a longer period of time.

We demand that no clean-up be made unless there is a substantial reduction in the probability of radioactive releases, and a major improvement in the intensity and scope of environmental monitoring; that the region around TMI be officially declared unsafe for

human habitation; and that agricultural products from the area be declared unfit for human or livestock consumption.

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## A Different Kind of Drug Abuse

Resistant strains of bacteria are on the increase.  
The cause? An overuse of modern antibiotics

Keepers of the public health are becoming increasingly disturbed by the U.S. Government's failure to respond to an alarming trend: resistant strains of disease-causing bacteria, undaunted by modern drugs, are increasing in number and diversity. The percentage of *Salmonella* that cannot be treated by tetracycline, for instance, has skyrocketed from 1 per cent in 1948 to over 40 per cent in the seventies. Other bacteria, including those responsible for typhoid and venereal disease, have experienced similar surges in resistance. Most alarming is the emergence of "multiple-resistant" strains, bacteria that can survive the onslaught of as many as seven different antibiotics.

Ironically, this medical menace is the direct result of the use of modern drugs. When an antibiotic is administered to a person or animal, two things happen. First, any resistant bacteria that are present flourish in the absence of competition from antibiotic-sensitive bacteria. Second, during their brief heyday, the resistant bacteria may, through a type of mating, spread their ability to survive drugs to other bacteria in the surrounding environment that did not come in contact with the antibiotic.

With limited antibiotic use, this process would not be cause for concern. In general, resistant bacteria diminish to their previous low levels after treatment has stopped. Problems arise, however, in the wake of widespread use of the drugs. In the unrelenting presence of antibiotics, constant selection leads to an overall increase in the pool of antibiotic-resistant bacteria.

Americans consume enormous quantities of antibiotics directly — enough penicillin, for example, to provide every person with a weekly dose. Doctors estimate that half

the antibiotics prescribed in U.S. hospitals are unnecessary, and that 80 to 90 per cent of those prescribed outside hospitals are given without any evidence of infection.

Even more disturbing, 40 per cent of the antibiotics used in the nation are administered for non-medical purposes. Since the fifties, livestock producers have been turning to feedlots as a way of boosting productivity. This means of livestock production, undesirable for its polluting effects and inefficient use of humanly edible protein as feed, entails yet another social cost: antibiotics are used liberally and routinely. By adding antibiotics to animal feed, farmers can raise livestock in more crowded, less sanitary conditions than would otherwise be possible. Furthermore, for reasons not fully understood, the practice stimulates weight gain. Antibiotics are now fed to half the sheep marketed in the U.S., three-quarters of the cattle, 90 per cent of the calves and pigs, and essentially all poultry.

The public health implications of this nonmedical use of drugs first surfaced in 1965, when six Britons died from a multiple-resistant bacterial infection. The incident was traced to contact with intensively reared, antibiotic-fed cattle that had served as reservoirs for the growth of drug-resistant bacteria. The British Government responded swiftly by commissioning a study of the problem. When the linkage between antibiotic overuse and the expanding pool of drug-resistant bacteria was confirmed, Britain banned the addition to animal feed of any drugs important in human medicine. The World Health Organization supported the ban, and by the early seventies, West Germany, the Netherlands, Czechoslovakia, and the Scandinavian countries had

also adopted restrictions. In those countries where it has been strictly enforced, the measure has been met with success and cases of resistant *Salmonella* have reportedly plummeted.

In the United States, the story is different. The emergence of resistant bacteria has not prompted the government to restrict the use of antibiotics despite a proliferation of American studies that demonstrate the risks of excessive antibiotic use. In 1977, more than a decade after the British incident, the U.S. Food and Drug Administration took tremulous first steps toward the adoption of restrictions on the use of antibiotics as feed additives. Congress, however, postponed the ban, requiring "further study" of the problem. The report commissioned by Congress has, predictably, proposed more studies. In 1980, a bill supporting restrictions died in the early stages of consideration by the House of Representatives. Congressional sources view further proposals to restrict antibiotics as highly improbable during the Reagan administration.

Why the delay? The U.S. livestock industry, bolstered by the major pharmaceutical manufacturers, has vigorously opposed antibiotic controls. They argue that it is unclear how much of the problem of increased antibiotic resistance is being caused by the use of drugs in animal feed and how much is due to greater drug use in human therapy. The industry has failed to realise, however, that the long-term nonmedical use of antibiotics is likely to be counterproductive. The declining effectiveness of these drugs in the treatment of diseased animals could ultimately result in decreases in livestock productivity that would more than offset any initial decline in output due to a ban.

It is time to stop quibbling about which form of antibiotic use is causing more damage, and to take steps to reduce drastically the consumption of these drugs in doctors' offices and feedlots alike. The fact that the more antibiotics are used the less effective they become suggests a Catch-22 situation that we had best reckon with. Unless we act soon to limit these drugs to high-priority uses such as saving lives, we may lose their value altogether.

*Paige Tolbert*

# Black Hormones — Action or Procrastination?

Britain has steadfastly resisted moves to ban the use of hormones in livestock — despite pressure from the EEC. **Joanne Bower** looks at their disturbing health effects and assesses a recent report on their use.

Disturbing long-term effects of unnatural but "economic" methods of livestock production have recently been demonstrated by a series of events which have threatened a whole industry. Abnormal growth in babies in Italy was linked with the presence of active hormones in veal-based baby foods. Although the administration of both natural and synthetic hormones to livestock is banned in Italy, their manufacture and trade is not forbidden, and a large amount of veal is imported. A panic reaction brought about the banning of veal sales. A voluntary boycott also affected such sales in Belgium and France, where veal was described as "a product of mediocre quality, potentially dangerous to the consumer and a source of energy wastage." Such restrictions were reflected in the international trade in veal calves, for which demand quickly dropped, resulting in a dramatic fall in value. (Veal calves in this country destined for export for intensive rearing were described by the N.F.U. as "innocent victims" of the hormone scare).

By the autumn of 1980 proposals were already being put forward to the Council of the European Communities to ban the use of hormones for growth-promotion in livestock and strictly limit their use for other purposes. These proposals appear to have been based on a *Black File on Hormones and Antibiotics* produced by the Européen Bureau des Unions de Consommateurs (EBUC) in Brussels, which declares unequivocally that all hormones in varying degrees present cancer hazards and the risk of morphological changes, and all have a negative effect on quality. The report indicates that even in countries where the use of hormones as growth-promoters is banned — and this does not include the U.K. — lack of adequate control is responsible for their widespread use. In Belgium, whose legislation in this field is very strict, it is estimated that between 70% and 90% of cattle

are treated with hormones, and even in the Netherlands, where controls are rigorous, certain irregularities have been found. Germany has a flourishing black market, especially in the most toxic hormones. The European Bureau is therefore recommending not only far-reaching European legislation, but calling for more natural rearing methods for livestock which would not involve the necessity for hormone and antibiotic fattening techniques, or their heavy use as medicines.

The development of industrial livestock rearing and contractual obligations to firms manufacturing and distributing these products are said to have swept the farmer along with the tide. In the veal industry, especially, producers have entered into arrangements with feed firms which have supplied the young calves and the feed, laced with various drugs, as a package deal. When things went wrong, the producers were simply advised by the feed firms to increase the drugs.

Two French producers were in fact ruined by such fraudulent practices, and as a result the "Paysans-Travailleurs" movement was launched, which took the suppliers to court. In this country, various intensive methods with lambs and goats are now being introduced in which proprietary feeds play an important part.

Competition is always put forward as the excuse for undesirable practices in agriculture, from battery cages to the use of growth-promoters. These are, however, part of the unnatural rearing processes which involve so much stress that animals must both be medicated and rushed to killing weight before disease takes over. Hence the use of hormones, antibiotics and other drugs for fattening and medication. A black market — which also exists in this country — has been easy to operate, because synthetic hormones are simple to make by any chemist with a standard laboratory. Lack of controls in exporting countries

facilitate fraudulent imports, especially as hormones are classified as "chemical products," about which customs authorities know very little.

Many years ago a German television documentary exposed such a black market resulting in illegal treatment by which animals were caused severe suffering, with quite unknown effects on consumers. Although well authenticated, the programme appears to have had little if any effect, judging from the present situation in Germany.

A "grey" market based on the therapeutic use of hormones, appears to be fairly general, and is the province of certain unscrupulous vets and chemists, who order huge quantities of hormones and re-sell them under the counter or with false prescriptions, when they do not personally administer them.

It is noted in the EBUC report that hormones give rise to the appearance of tumours, linked to specific types of cancer; that due to their effect of multiplying certain cells, they can activate cancerous cells and thus accelerate the appearance of a cancer; and that they can also activate viruses which give rise to cancers or activate their development.

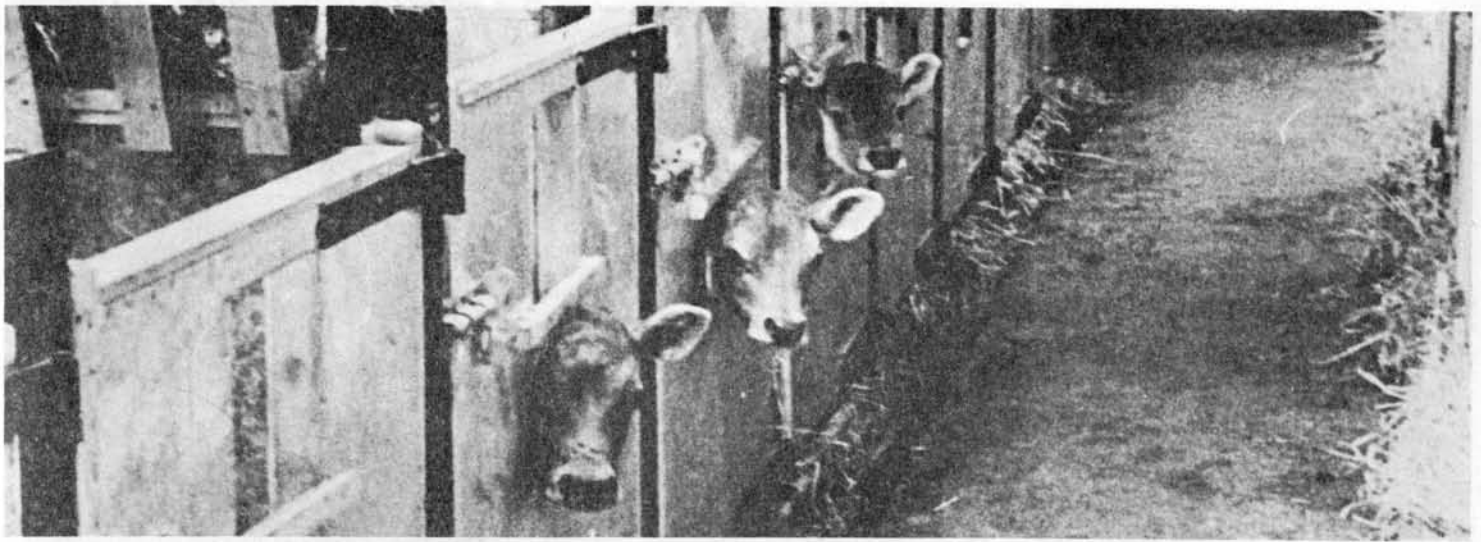
Risks to the consumer are in the residues of hormones in meat, and the possible transference of activated viruses, which does not depend on residues but on the administration of hormones during the whole fattening period.

It is further pointed out that all hormones are capable of causing morphological changes, especially in children and elderly women, and that such changes are sometimes irreversible.

Milk of treated animals also contains high concentrations of hormone residues. In theory such milk should not be marketed, but strong doubts are expressed as to whether in fact it is withheld "with the resulting known risks for the whole chain of milk and dairy produce."

The EBUC report notes that in several countries of the Community there is opposition be-





tween the Ministers of Health, who support consumers' interests and the Ministers of Agriculture, who support the producers. This was highlighted in Italy, where, last September, the Health Minister banned twenty-two veal-based baby foods and a few days later chicken-based baby foods, with a view to thorough analysis. The Minister of Agriculture actually opposed these measures. Other Ministers tended to vacillate and procrastinate. Our own Government agrees in principle to tightened controls, but wants a delaying period. Administration of both natural and artificial hormones is permitted here, dependent only on the method of administration. Trade and possession are also permitted, and there are virtually no checks or penalties on any but therapeutic uses. In the case of these, the Pharmaceutical Society has only 20 inspectors whose job is to investigate and follow up illegal sales, with a reservation regarding de facto responsibility for products.

The Consumers' Union finds that no country has adopted appropriate penalties. Although provision for fines and the removal of an animal from the food market exists in most countries, it is pointed out that while this is a disincentive for small-scale producers, it is "derisory in the face of possibilities for profit achieved by large farmers."

Intensive methods involving the cramming of animals in buildings and quick growth stimulants are condemned.

"Such practices lead to deterioration in the organoleptic qualities of the meat, and lead to frequent abuses (hormones, antibiotics and other toxic sub-

stances) that put the health of the consumer at risk."

It is further held that such methods are not rational:

"The fattening of calves on powdered milk represents a *huge waste* of energy when compared with a calf *reared by its mother*. In fact unbelievable quantities of milk are processed, transported, processed, turned into powder and transported again for use in rearing, without any economic justification. In fact, it is the ludicrousness of the subsidies provided by the Common Agricultural Policy that means that farmers buy back at half price, in the form of milk powder, the milk that they have sold to the dairies. It is unacceptable that the Common Agricultural Policy, using the pretext of supporting the market, encourages rearing methods of poor quality at the expense of healthy and economic rearing.

This is the crux of the matter. The development of factory-farming has by all kinds of means been encouraged by governments, with the result that conscientious farmers have either been forced into systems which they cannot approve, or put out of business. For many years misgivings, and indeed grave warnings, have been expressed about the use of hormones and antibiotics for livestock, and the desirability of better methods of stock-rearing which would make their routine use unnecessary. Now at last we have proposals for regulations presented by the European Commission to the Council:

- 1) concerning the use of substances with a hormonal action and those having a

thyrostatic action in domestic animals;

- 2) laying down conditions for controlling the possession, distribution and administration to animals of certain substances with a hormonal action;
- 3) concerning the control and examination of animals and meat in the Community for the presence of residues of substances with oestrogenic, androgenic, gestagenic and thyrostatic effect.

These proposals will no doubt be subject to opposition by vested interests, not to say farmers' unions representing agribusiness, and even governments, and may be watered down or left without adequate policing legislation and mechanism. If we really want more wholesome livestock rearing methods now is the time to bring pressure on appropriate government departments (the Ministry of Agriculture and Department of Health), our M.P.s, both here and in Europe, and — especially — the medical profession, which should be making a determined effort towards a positive health policy rather than dealing almost entirely with disease which is costing the country thousands of millions of pounds a year.

Joanne Bower

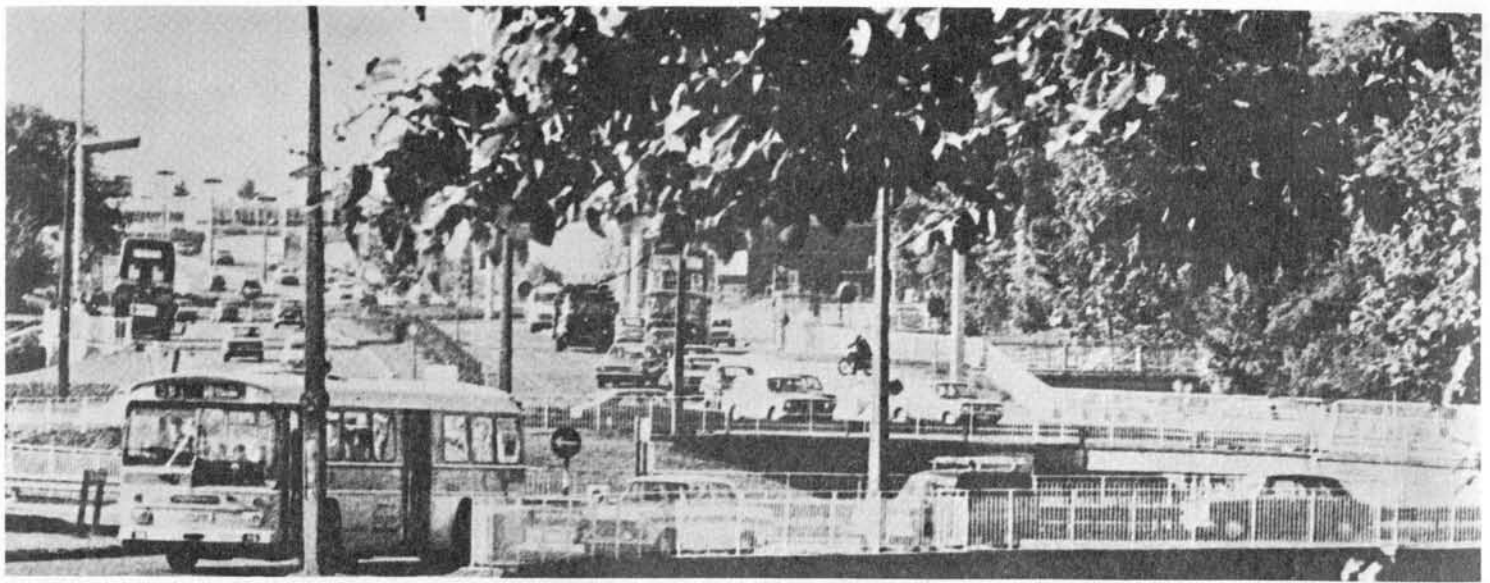
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# Our Daily Lead

The British Government's decision to reduce the level of lead in petrol by two-thirds is a step in the right direction — but, once implemented in 1986, it will still result in some 3000 tons of lead being pumped into the atmosphere every year. Yet, whilst much attention has been paid to the effects of airborne lead on the intelligence of children, little heed has been given to the high lead levels in food grown in this country. Indeed, as Nicholas Kollerstrom reports, there is scarcely a crop in Britain which has lead levels that are fit for consumption by infants . . .

*Inorganic Pollution in Agriculture* is the proceedings of a Ministry of Agriculture conference held in 1977 and published last year. At the time of the conference, the maximum permitted level of lead in foodstuffs was 2.0 parts per million (ppm) — and most, but by no means all, of the lead levels in crops and herbage documented in the report fall below that limit. Since 1979, however, the World Health Organisation's limit for lead in baby foods has been 0.2 ppm. There is scarcely a single crop lead concentration given in the report which is as low as this: indeed, it appears that almost all the vegetables now grown in Britain fail to meet the modern lead levels for baby food.

Since we have been putting thousands of tons of lead each year into the air as fine dust for decades, this is perhaps no cause for surprise. As Dr Russell Jones recently wrote in *World Medicine*, "For vegetables with a high surface area it would seem there are few places left in the British isles where crops can be grown and still considered fit for human consumption".

Much of the data in the MAFF

report is given as dry weight concentration, and as a rough guide this can be converted to a fresh weight concentration by dividing by ten (assuming that the crop is 90 per cent water) in order to compare it with permitted food limits. Let's look at a few of the figures given in the report.

Five farms in the Bristol area were sampled for lead in herbage. One downwind from an industrial site had a mean (from nine samples) herbage content of 31 ppm dry weight. Plainly, this is quite unsuitable for human consumption. The other four farms had mean lead levels of 7, 5, 4 and 4 ppm (dry weight) in their herbage. "Taken individually none of the values exceed the threshold values usually accepted", says the report. Even referring to the 2 ppm limit, that comment is of doubtful validity: it is quite inapplicable when it comes to modern limits. And, it should be noted, most vegetables absorb more lead than grasses.

Especially disturbing is the way in which the application of sewage sludge to the land is raising its lead content to levels where it may no longer be suitable for growing

crops: "Most of the sewage sludge produced inland in the UK is disposed of to agricultural land . . . With the present high cost of inorganic fertilisers many farmers take the opportunity to use sludge as a means of keeping down their growing costs."

Sewage sludge nowadays generally contains in the region of 400 ppm of lead. The dust from car exhaust is washed down drains and thence passes into sewage. One measurement found nearly 3000 ppm in sewage sludge. Application of this sludge for two years to the soil pushed up the lead content of grass grown on it by thirty-fold (from 14 to 410 ppm dry weight). Another survey found that land treated with sludge for 35 years has acquired over 1000 ppm of lead in the top-soil. For comparison, the global average is 16 ppm in top-soil and the UK average is 30 ppm.

One survey compared vegetables grown on a sandy, loam soil where applications of sewage sludge had been applied for approximately 15 years with samples from an adjacent field receiving no sludge. Lettuce, which tends to accumulate higher lead levels than other



crops, had 38 ppm in the treated field and 14 ppm in the untreated field (dry weight). The MAFF report, however, does not remark that neither levels are fit for human consumption. Indeed, nowhere does the report comment that the addition of such highly concentrated levels of lead to farm soil amounts to the cumulative poisoning of farmland. And, as lead is highly insoluble, that poisoning is irreversible.

If one is to evaluate just how much observed lead levels have been raised by industrial pollution, the question of what constitutes a 'natural' biological lead concentration is, of course, critical. From the MAFF document, one gains the general impression that crop lead levels of 0.5-1 ppm (5-10 ppm dry weight) are quite 'natural' and nothing to worry about. One report quotes a level of supposedly uncontaminated herbage as a baseline figure for comparison. It happens to be almost the only lead level quoted in the MAFF document which falls below the permitted level for infant food.

However, if by 'natural' we wish to denote pre-industrial levels, then we must go down several orders of magnitude, to figures which are fractions of a part per million. Thus, C. Patterson of the California Institute of Technology has concluded that "the average concentration of lead in a mixture of meat and vegetables in the human diet during prehistoric times may have been 2 nanograms per gram (wet weight)." Two nanograms per gram is two thousandths of a part per million. A concentration of around two parts per million (wet weight) which one finds frequently in the MAFF report is therefore one thousand times higher than pre-industrial levels. Hence, we are today exposed to lead levels which are far and away above those which occurred whilst *Homo Sapiens* evolved.

In discussing the one area of Britain — North-East Scotland — where lead levels appear to meet current baby food standards, the Ministry of Agriculture assumes that the land is free from 'extraneous' lead contamination. But is such an assumption valid? In a study of Thompson Canyon, a part of Yosemite National Park in the Sierra mountains of California (and an ecosystem far from any urban centre), Patterson found that

"Even in this remote primitive area, chosen from its maximum isolation from man's activities, industrial lead brought in as aerosols appears to comprise 50 per cent of lead in soil humus, 90 per cent of lead in sedge plants and 95 per cent of the lead in herbivores and carnivores." In sedge leaves, Patterson found 0.5 ppm wet weight in tissues and 0.20 ppm externally.

It may help to put matters into perspective by adding that blood lead in children will normally today be in the region of 0.1-0.2 ppm. Discussion of any danger to health is controversial but tends to focus around the 0.2-0.3 ppm level. (Petrochemical industry experts quote a much higher figure; Conservation Society experts a lower one). The Medical Research Council is now believed to have a survey correlating reduced I.Q. with raised blood lead levels in schoolchildren over approximately this range — although it has assiduously avoided giving anyone the data over the past year, despite several requests. Thus, the new infant food limit of 0.2 ppm amounts to saying that children should not be given food containing lead at higher levels than those already present in their own bloodstreams. This is necessary since children absorb about five times more lead from food than adults.

In conclusion: MAFF's document fails totally to evaluate 'natural' lead levels and thereby gives no indication as to how much levels presently common in UK farms produce are above once-natural levels. Though published in 1980, the report gives no indication that the levels widely found surpass permitted levels: and its figures concerning sewage sludge graphically demonstrate that many British farmers are simply making their farms unfit for further production by the continued use of it.

*Nicholas Kollerstrom*

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## Books

### The Technological Rape of the Countryside

**THE THEFT OF THE COUNTRYSIDE** Marion Shoard, Temple Smith, £4.95.  
**DIET FOR A SMALL ISLAND** by Patrick and Shirley Rivers, Turnstone Press, £4.50.

**THE MAKING OF THE BRITISH COUNTRYSIDE** by Ron Freethy, David & Charles, £7.95.

The contention of Miss Shoard's book is that our countryside can survive most manmade changes with the exception of our high powered farming that uses tractors of 82 hp and over, pulling twelve furrow ploughs and the like. Technology of this kind has changed the farmer from the guardian and creator of our pleasant landscape into its enemy. The diversity of nature has to be cleared away and levelled out to make way for the machines. Roads are widened, fields enlarged, headlands straightened out, copses cut down and so on; the removal of hedges limits the amount of stock that can be kept out of doors, if any at all; as there is no stock to graze the grass breaks rotations are limited. Mixed farming, the best guarantor of fertility, is ruled out. The trend toward monoculture and specialisation is increased. The farmer becomes an industrialist locked in a chain of multinational companies who sell his inputs to him — fertilisers, machines, etc. — and buy his output. Mass production is the order of the day; if the farmer does not turn his farm into an intensive livestock factory, he sells crops for supplying to factories for processing. Big technology concentrates power and leads to authoritarian attitudes. The money generated by this kind of farming goes into the towns, so that while all this is in progress not only is the landscape despoiled but the structure of rural life is broken down as well. We have the sight, surely unique in history, of a prosperous agriculture in a bankrupt rural community without shops, schools, transport, policemen or firemen. This is the price we must

pay, we are told by the agricultural lobby, if we are to have cheap food, if indeed, in the long run, we are not to starve. Miss Shoard argues that this is blackmail, that we are suffering this terrible price to make rich farmers richer and that their defence is based on false assumptions.

*The Theft of the Countryside* is a remarkable, beautifully written, concentrated assault on the castle of the agricultural lobby. It is massively informative and needs to be read carefully from cover to cover. It is not surprising that the lobby is worried and have so far resorted to coarse abuse in their defence. Indubitably Miss Shoard has breached these masculine walls. It is most important to follow up the attack and to do this successfully we must get her arguments exactly right. I can only briefly outline them here. Only the book itself can do them justice.

John Young, reviewing the book in *The Times* said he had read it on a train journey. When he looked out of the window he did not see the bleak countryside described by Miss Shoard so he concluded that she was exaggerating. He has misread the book. What Miss Shoard is saying is that a process of change is gathering momentum that if not checked in time will destroy our countryside, but that we still have enough fine countryside left to make it worthwhile acting now. But act we must. She has been accused of accusing all farmers of being nothing but greedy profiteers and of refusing to appreciate their achievements since the war. This is not my impression. She has a firm grasp of agricultural history and is well aware of post-war achievements; but she also shows that this progress has been corrupted and exploited. The government assistance that after the war helped agriculture to recreate itself is now subsidising vandalism. Furthermore it is helping to destroy the small farmer, not to protect him. Miss Shoard does not attack all farmers; she is decidedly the friend of the small farmer and tries to awaken him to his perilous situation.

Patrick and Shirley Rivers' new book, *Diet for a Small Island*, applies the idea that we should start to eat today what we shall have to eat tomorrow: and which is nutritionally and spiritually better for us anyway. It adds additional support to Marion Shoard's assertion that we can feed ourselves perfectly well without using high technology methods: the Rivers agree with her that agro-industrial farmers grow food for profit, not people. They have assembled in a concentrated introduction to their recipes, sufficient facts from their own studies and experience to expose the arguments by which the food lobby and the food processing and retailing conglomerates justify their mislead-

ing techniques of salesmanship. All we have to do to bring them to the brink of bankruptcy these days of falling demand, when the profit margins of the mass production industries are so fine they cannot afford to maintain their massive capital commitments without government aid, is to grow our own food or to eat as far as possible food locally grown and marketed: above all the enemy of the affluent malnutrition on which agribusiness depends is to eat less and better — in which art the Rivers will instruct you.

You wouldn't suspect a book with such a beguiling title was revolutionary dynamite would you? But read in conjunction with *The Theft of the Countryside* you can see why. It is *The Peoples' Nutritional Manifesto*: or how to live and eat better and more cheaply and bust the profiteers' system.

*The Making of the British Countryside* is not very much concerned with agribusiness and nutrition: but it supports Miss Shoard's view that nature can adapt to most manmade changes except intensive high technology farming. There are some delightful chapters on nature in towns, airports, on railway embankments and so forth. Ron Freethy is a born teacher, he communicates his zest and enthusiasm and love of nature and frequently startled me with facts I suppose I ought to have known, but didn't and which stick in the memory — such as why plane trees flourish in urban settings. Although this book cannot claim to be a study in depth of the history of our countryside, the selected facts are among the most significant, and clear out of the way several false ideas about, for instance, the royal forests. I would like to have sent my children to the comprehensive school where Mr Freethy is head of the science department.

Robert Waller

### Hidden Places

**THE GREAT SEASONS** by David Bellamy and Sheila Mackie. Hodder and Stoughton, £9.95.

**THE BACKGARDEN WILDLIFE SANCTUARY BOOK** by Ron Wilson. Penguin, £2.95.

The popularity of David Bellamy's television programmes will doubtless ensure a large sale for *The Great Seasons*. As a lifelong abstainer from television, I opened the book with some misgivings. A short text, lavish illustrations — was this just another instant best-seller from a media personality? I was pleasantly surprised; for despite some deficiencies of style,



Bellamy has the talents of the born popularizer. *The Great Seasons* might be described as a plain man's guide to palaeobotany: it takes as its theme the changing ecology of a Pennine valley from the Ice Age to the present day.

Bellamy from obvious motives preserves the anonymity of his chosen area throughout the book, referring to it simply as the Upper Dale. (Its identity will quickly become obvious to any reader familiar with the north of England or with the ecological controversies of the past ten years.) In one way this is a pity, as it prevents him from including maps to complement his text, and supplying the references serious students would like. But it is unfair to grumble when an author fails to do what he is clearly not trying to do: Bellamy's light yet learned portrayal of 12,000 years of landscape history will introduce thousands of non-specialist readers to the delights of a new field of knowledge. Sheila Mackie's numerous full-page illustrations are superb, and I know I shall return to them many times.

David Bellamy mentions somewhere the possibility of setting aside a section of one's garden, clearing and turning the soil and then just leaving it — year after year — as a continuing experiment in plant ecology. The idea would appeal to Ron Wilson. *The Backgarden Wildlife Sanctuary Book* draws attention to the importance of gardens as a "supplementary habitat" for threatened wildlife, and is full of practical suggestions for making one's garden more desirable for animals of all kinds. No garden is too small. (Some neighbours of mine have a pond about five feet square which every spring seethes with copulating amphibians — it must keep the whole parish supplied with frogs.) If you want to make a pond Ron Wilson tells you how. Also if your fancy is for hedgehog houses, caterpillar cages, or nest-boxes for birds, bats or bumblebees. This book too has fine illustrations, some new, some taken from Victorian natural histories. And Wilson is particularly good on Further Useful Information, should you wish to buy butterflies by mail-order, learn about bee-keeping or join a campaign to Save the Village Pond. We can't all live in the Upper Dale; we can't even all visit it without destroying what we go to see: but anyone with access to a few yards of soil can do something to atone to nature for the crimes of mankind.

Nicholas Gould

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## A Polluted Future

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BRITAIN'S WASTING ACRES by Graham Moss. The Architectural Press. £13.50.

ENVIRONMENTAL POLLUTION by H.M. Dix. John Wiley & Sons. £5.95, cloth £14.95.

THE ECOLOGY OF NATURAL RESOURCES, second edition, by I.G. Simmons. Edward Arnold. £8.50.

THE GREENHOUSE EFFECT by Harold W. Bernard Jr. Ballinger £8.50.

Graham Moss has written a very "caring" book, illuminated by a large number of highly evocative illustrations. Sub-titled 'Land use in a changing society,' *Britain's Wasting Acres* states at the outset the premise that land is Britain's most precious and irreplaceable natural resource, yet the relentless demands of a consumer society combined with the pace of industrial change has created land wastage on a most alarming scale.

This loss is highlighted by the fact that world population is currently increasing by about 70 millions a year (which makes the problem a universal one) and the author looks at the ways various forms of land wastage can be reduced so that all these extra human beings can be supported.

He calls for an 'ethic of responsibility' based on the concept that we all depend on the resources of the earth and cannot take out more than our planet can replace. In education, he sees one of the most valuable ways of getting this message across.

The north-country saying "where there's muck there's money" typifies a long-standing attitude that pollution in industrial areas is inevitable. However, in *Environmental Pollution* H.M. Dix the author, sees the attitude presently prevalent as one of 'how much pollution can we afford?', meaning that the cost of anti-pollution measures is the controlling factor.

Looking to the future, he recommends a long term strategy and, like Moss, calls for education and a sense of responsibility.

Education and man's relationship with the environment is also the inspiration of I.G. Simmons' *The Ecology of Natural Resources*, a book intended to help university students. It is a detailed and well annotated study which he describes modestly as an introduction to the subject.

In this new edition, appearing seven years after the first, not only has the statistical information been up-dated but greater emphasis is now given on energy which, in 1974, was

not generally envisaged as the all-embracing problem it has become today.

The author defines and describes the resources available to man and proceeds to investigate in detail the often conflicting demands on them.

Having postulated an inventory of the biological and physical limitations of the planet he calls for a new strategy of man-environment relations. As material-using animals, this will also involve the making of moral choices by man.

Pollution of the atmosphere, in particular by carbon dioxide is the specialised subject of Harold Bernard's *The Greenhouse Effect*. By the middle of the twenty-first century, the earth could be warmer than at any time in the past 125,000 years. As an article in the 1979 issue of *Nature* put it, 'The release of carbon dioxide to the atmosphere is, conceivably, the most important environmental issue in the world today'.

So what does the author suggest should be done to control the greenhouse effect before the increase in earth temperature upsets rainfall patterns, agricultural regions, coast-lines and, indeed, the world's economic and geo-political stability?

The first, and clearly obvious, priority is a reduction in the use of fossil fuels and greater use of the best resource of all — conservation.

The key issue lies in the enormous climatic consequences to be faced if (the author says 'when') the greenhouse threat becomes a reality. Harold Bernard is a meteorologist and the core of his book is devoted to the subject of weather, past, present and future. Like other experts writing on the subject he has to admit to the remote alternative to 'baking' — a return to the ice-age due to a 'wobble' of the earth's axis in its orbit of the sun which 'could save us from our own hand'. Altogether, *The Greenhouse Effect* is an entertaining book about a serious subject.

These four books preach one lesson; that in the long term only man can save himself and the sooner he starts doing something about it, the better.

John Bruce Lamb

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## Sensible Eating

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MEDICAL ASPECTS OF DIETARY FIBRE, a Report of the Commission of the Royal College of Physicians, Pitman's Medical Ltd. 1980. pp. 175. £4.95.

Recent years have seen an ever-growing interest in dietary fibre as a

potentially important element in the prevention and treatment of certain diseases. However, the subject gave rise to a good deal of controversy, which tended to obscure the issue to such an extent that it became necessary to have a clinical assessment of the situation. At the beginning of 1978 the Royal College of Physicians agreed to set up a working Party under the chairmanship of Sir Douglas Black to report on the medical aspects.

This Report, in spite of the many difficulties the Working Party had to face, is in many ways a model of what such reports should be. It covers most of the essential aspects of the question without prejudice and with abundant references to all the opinions reflected in the modern literature on the subject. Obviously, it is written mainly for the medical or scientific reader, but it contains a great deal which should be of interest to all concerned with public health and nutrition.

In general, the conclusions reached by the Commission have been conservative. On the positive side, the Report considers that fibre in diet is important and that there are, undoubtedly, certain clinical states in which patients should be advised to add fibre-containing foods to their diet. The epidemiological evidence suggests that certain diseases, such as diabetes, cancer of the colon, gallstones and heart disease are much less common among populations living on a high-fibre diet instead of the processed foods of Western countries.

The report also concludes that a high-fibre diet can prevent and reduce obesity, mainly because it is more solid and chewy than processed foods, and therefore more satisfying, so that less is eaten. While this is true, the Commission does not appear to have given sufficient consideration to the evidence that fibre in diet inhibits the insulin response of the organism, thus avoiding an excessive deposit of fats in the body.

The section of the Report which will probably give rise to most controversy and (it is to be hoped) future research, is that concerned with the effects of a high-fibre diet on the metabolism and absorption of certain minerals from foods, especially calcium, iron and zinc. While the absorption of chromium is possibly increased by the consumption of high-fibre diets, it is maintained that they give rise, at least in the short term, to malabsorption of calcium, iron and zinc, especially when there is a vitamin D deficiency. For this reason the Report suggests that care should be taken in advocating the use of these diets in the case of Asian immigrants, the elderly and menstruating women. This part of the Report will inevitably lead to heated discussion,

because it contains anomalies which are very difficult to explain. The differences between the mineral contents of wholemeal flour as opposed to refined white flour are very great. The iron content of 70 per cent extraction white flour is only 11 mgs/k. as opposed to 34 mgs/k. in wholemeal; while that of calcium is 160 mgs/k. in comparison with 319 mgs/k. It seems strange, therefore, that there should be a malabsorption of iron and calcium from the latter and not from the former, when the opposite could have been expected.

Communities which have lived all their lives on a high-fibre diet do not show signs of deficient serum balance in these minerals, while vegetarians in the UK taking a diet containing about 42 gms of fibre per day, do not show signs of reduced haemoglobin values.

At the moment, there is no real explanation for these apparent contradictions, and further studies are obviously needed. However, part of the answer may lie in adaptation. It could be that the metabolism of those accustomed to a low-fibre diet, with refined carbohydrates and processed foods, may need a more or less long period to adapt itself to the high-fibre foods. On the other hand, those accustomed to a high-fibre diet from an early age are already adapted to it and suffer no harm from it.

There are several medical aspects of dietary fibre which need further study, and the Report mentions most of them, including hiatus hernia. However, we would like to include two others — intestinal hormones and the effects of fibre on patients who have had an operation by selective vagotomy for relief of a gastric ulcer. It would be instructive to see how a diet rich in fibre affects these conditions and also the calcium balance in such patients.

In fine, this is an excellent book. It is to be hoped that Governments will take notice of its recommendations and that it will be read by all who have an interest in healthy, natural foods.

David L. Greenstock

### An Ancient Ideology

THE POLITICS OF SELF-SUFFICIENCY by Michael Allaby and Peter Bunyard. Paperback £3.95.

The idea for this book by two of *The Ecologist's* erstwhile editors and contributors arose as a result of a series of lectures they gave jointly at Exeter University's Department of Extra Mural Studies. Although in

every way a collaboration it is refreshingly free from one of the irritations of joint authorship — the watering down of opinions where the authors cannot agree. Each chapter in this book is written by one of the two and commented upon by the other (but woe betide the reader who skips the Preface and has not grasped the arrangement!). On the whole this makes good reading although, since fundamental differences do exist, one might have expected, and would have relished, rather more red blooded cut and thrust. "We must not necessarily damn him because we find him inconsistent" writes Michael Allaby of the 'would-be' self sufficient man. And nor indeed should he, for inconsistency is a recurrent characteristic of this book which both intentionally, and at times I believe, unintentionally, demonstrates the impossibility of being either totally consistent or totally objective when hypothesizing about a self-sufficient society. In fact one of the things that makes *The Politics of Self-Sufficiency* so readable is that it sails along through the rapids of Allaby's outright dismissal of almost all prophecies of future calamity, world pollution and similar catastrophes (among other things he sees no imminent shortage of resources; welcomes the microchip; finds serious flaws in the rationale of *Limits to Growth*) and Bunyard's gentle backwaters where he pleads for the validity of a somewhat romantic rural dream. Their two vessels, trying to negotiate the rocks of social responsibility; ownership of land; democracy and anarchy, career inevitably into just about all the hazards that await the navigator of these tricky waters.

An aspect of Goldsmithian ecology that has always troubled me is his uncompromising belief that Man's departure from his hunter-gatherer state was an aberration, I was therefore beguiled by Allaby's dismissal of this premise. He prefers to regard the spread of our ancestors across the globe and their eventual domination of it as preordained — and proved by the fact, as he sees it, that Man has never been a climax species — on the contrary his extraordinary diversity points to his having been ever an opportunist, and further an opportunist who is inherently creative and inventive; a species that differs from all others not only in its use of language but in its ability to plan and to collaborate. Thus primitive man (far more than contemporary man) having cooperated with his fellows in the finding of food and building of shelters, had time in his daily life for social activities; for dancing and music making and conversation; for inquiry and experiment; for the practice of art, ritual and religion. In a word for the development that



has continued down the ages until it culminated in industrial man, who, Peter Bunyard believes, is informed as much by spiritual and ideological needs, as by the purely practical, in his search for self-sufficiency (but here I think Peter should have written *self-reliance* — a more important goal for spiritual man).

Of course it's all arguable as are the definitions of self-sufficiency and the motivation for the present resurgence of interest in community living, d.i.y., and growing food. There is a suggestion from Michael Allaby that people who retreat — whether single families or in groups — to try and do their own thing on a small-holding can be compared with those who sought to escape the discomforts of war by holing up in a neutral country. I find this hard to swallow — but in any case why try to fit all self-sufficiency seekers into a single mold? Really, as everyone must know, only people with a fairly large supplementary income can hope to be *comfortably* off living on a subsistence farm. For most of those who try this alternative life style the compelling reason is surely a wish to distance themselves from the rat-race of a material society with whose values they cannot identify. The point is taken that they mostly accept the benefits of a free health service and free education — social security as well I dare say — but to quarrel with this is to quarrel with the concept of a welfare state (which I do) and is not really valid as an argument against trying to be self-sufficient. We nearly all accept these benefits whether we grow our own vegetables or not. Much is made, rightly, about the traditional farming skills that commercial farmers are losing sight of, and here it is even suggested that at some future date we shall have to import peasants from India to teach us how to till our land without the benefits of petroleum products (although Michael Allaby, of course, sees no imminent danger of our farmers running out of fuel or chemical fertilisers) — I'd rather the self-sufficiency people learnt those skills even if 'Old Hodge', leaning on the gate and chewing his traditional straw, does laugh at them up his sleeve.

Quite a lot of the ground covered in this book will be familiar to regular readers of *The Ecologist*, but don't let that put you off for a moment. The sudden forays into controversial issues; the pauses for philosophical rumination; the examples from history; the elaboration of some familiar ideas and well chosen quotes from a wide selection of sources, ancient and modern, combined with the dual authorship, ensure that *The Politics of Self-sufficiency* is never dull.

Ruth Lumley-Smith

## OTHER BOOKS RECEIVED

**The Superpoison**, Tom Margerison, Marjorie Wallace and Dalbert Hallenstein, Macmillan £7.95.

The story of the Seveso chemical factory disaster from July 1976 when a cloud of deadly dioxin coated fields, gardens and buildings, through the two following years of tragedy, blunder and cover up. The causes, the background and the inevitability of such catastrophes are revealed. It sounds unbearable, but like all good investigative journalism proves unput-downable.

**Breakthroughs**, Charles Panatti, Pan Paperback £1.95.

Meant to be taken very seriously of course, Panatti's predictions include a chemical that will enable you to slim while continuing to be a glutton; a vaccine to prevent pregnancy; clean and nearly limitless energy from fusion-power by 1989 (Let's get this over to the CEBG without delay) along with flying trains and age retarders — good for a gasp and a giggle.

**Sur la Vague Verte**, Brice Lalond, Robert Laffont paperback (in France)

The personal credo of one of the leading members of the French ecological movement.

**The Environment — Issues and choices for Society**, Charles and Penelope ReVelle. Van Nostrand Reinhold £14.20.

Very American, very comprehensive and well illustrated this text book for college students is neither controversial nor profound — it also manages to produce all its wealth of material without actually making it sound remotely exciting.

**Fertility Gardening. The Organic way to make your garden grow**, Lawrence D. Hills. Cameron and Tayleur. David and Charles £6.50.

The author needs no introduction to *Ecologist* readers. In his latest book he writes of some of the aspects of gardening close to his heart — organic practices, compost (it all sounds so much easier than it really is — mine never comes out like that) — comfrey as a manure and comfrey in compost, other green manures and animal ones, sewage and mulches and seaweed. Mr Hill's enthusiasm and his longing to communicate his vast fund of knowledge to the rest of us, zooms out of every page.

**The Greatest Power on Earth. The story of Nuclear Fission**, Ronald W. Clark, Sidgewick and Jackson £8.95. Concentrates on the impact of the nuclear age on national affairs and world politics as well as outlining the history of its development. A chilling book.

**Wildlife Biology**, Raymond Dasman, John Wiley £9.00.

The first edition was published over ten years ago and the author has made a number of changes in this best of introductions to wildlife ecology. Intelligently organised, well illustrated, easy to read and above all not too long. Recommended.

**The Natural History of the Gorilla**, A.F. Dixon, Weidenfeld and Nicolson £16.50

The World Naturalist Series of which this is the most recent title (previous publications are *The natural histories of trees — whales — fossils and biological clocks*) is much more original in its scope than many "popular" books on natural history. The importance of Dr. Dixon's work is that it examines in detail not only the evolution, distribution and behaviour of this now threatened species, but clarifies and underlines its present precarious status in the face of the massive destruction of the rain forests upon which it relies for survival.

**The Wolf: his place in the Natural World**, Erik Zimen, Souvenir Press £9.95

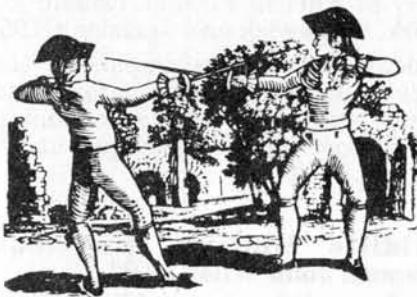
A welcome addition to the library of anyone fascinated by this much misunderstood wild animal. Zimen is a Swede who has lived with and studied wolves all his life, most recently as leader of the IUCN/WWF project on the wolf in Italy. Full of anecdotes and wolf lore, personal observation and scientific fact, and well illustrated.

**Mountain Wildlife**, Richard Perry, Croom Helm £6.95.

Gorillas and wolves appear again, among many other species from the marmot to the yeti, in Richard Perry's latest book, in which he turns his attention to the wildlife of the mountains from the Cairngorms to Ethiopia. Illustrated.

**Glossary of Air Pollution**, WHO Copenhagen. Sw Fr 12.

Not designed for the general reader, but very useful for anyone encountering the terms used in pollution literature which cannot always be understood by reference to common sense, a classical education or recourse to a good dictionary.



## Letters

### Our Apologies

Dear Sir,

I appreciate that your valuable magazine has found my and Peter de Rú's report on Joe Harding worth publishing. (The Ecologist, December 1980, page 358-360.) What I do not appreciate, however, and regard as serious is the remarkable fact that neither of us has been asked for permission nor been notified about the publication. This in spite of the substantial abbreviation of our report that you have undertaken, an abbreviation to which I would not have given my approval.

Given the often reality-distorting and dishonest way in which many of today's mass media function I consider it of extreme importance that papers like The Ecologist show a strict adherence to copyright principles and praxis. The ultimate victim to violations of these principles is the reader. As journalist and political man I find it a matter of course to be responsible in front of the readers for what appears under my name.

Yours faithfully,  
Pierre Fröhling,  
Blekingegatan 18,  
S-116 56 Stockholm,  
SWEDEN.

The Editors would like to apologise unreservedly to Pierre Fröhling and Peter de Rú. The publication of their article without their consent was due to an unfortunate series of misunderstandings.

### Acting within our powers

Dear Sirs,

I sympathise with your correspondent, Victor Prochaska in his somewhat challenging letter published in the "Ecologist" (Jan/Feb 1981). As a concerned

"Ecologist" myself I too have felt frustrated and at a loss, since the whole movement is based on restraint and calls more for "do not do this" rather than "do that".

Nevertheless, I believe in subscribing, I am helping to have matters of crucial importance to the future of the world reported — something which is sadly lacking in the triviality and gossip which characterises the ordinary press.

Mr Prochaska demands to be told what to do. And that is the essence of the problem. For humans generally are not thinkers and this is why they are so blindly obedient to traditional values and short term goals, no matter how ultimately damaging and pointless they may be. Their course is prepared to them before birth and they mostly conform, all the way.

The greatest obstacle to conservation, pacificism and kindred worthwhile objectives is, and always has been, human nature itself. Locked within our human social contract, we live, perforce, as other species do, like sentient robots responding to set stimuli. The only real variations in behaviour are due to conditioning, which has evolved solely for the 'immediate' benefit of our own species. It is as though all through history, the world has been dominated by myriads of little human egos all hell-bent every moment on immediate self-gratification.

We are obliged to live like the bees and the butterflies — although in a rather more sophisticated style — but always in the same basic pattern. Our destiny is exactly as theirs — reproduction and death. We have, because of natural curiosity learned much of the world about us — and have often used that knowledge for immediate short term gain, with often horrendous effects on the world and ourselves.

Unfortunately, as part of nature, we do not have the power to break out of our natural cycle, so we go on proliferating and multiplying our errors. The only possible hope for the future lies in abandoning our "self-worship" and substituting a passionate concern for the Earth — which quite literally is all that abides. I cannot see how this can become an integral part of all human consciousness — yet nothing less is ever going to have a real effect.

The only real hope for the future is to be found in the various ecological and

conservation groups and population organisations. There are two reasons for supporting these. One — it is the only way in which we can transcend our finite lives and give them purpose and meaning — a little permanent personal immortality, even if anonymous. Two — it is the only way in which we can repay our debt to the world which produced and sustained us. If these groups received massive support from the "grass-roots" we might even survive the crass ineptitude of the majority of world Governments.

It might even be possible to eliminate the "double bind" of human rationality and arouse conscience in those, who for the immediate benefit of receiving an income to raise their families will perform research and tasks designed to make the world much more dangerous for their own successors — those, for instance, who use their "intelligence (?) to design and make all kinds of artefacts for the mass extermination of life, whether human, or animal. People who have in fact forfeited such integrity as they have in order to preserve their own self interest and social prestige.

Another significant alteration might be that collective society might be kinder to those of us, who at the end of independent living, are kept alive often in terrible suffering and mental frustration, against their own wishes, since we in our reluctance to understand ourselves and still so attached to our "species self-worship" cannot see how cruel it is to make any creature "pay" in this way for lost experience.

As I see it — the only real hope lies in the strengthening by increasing membership of organisations such as the R.S.P.B., Friends of the Earth, the county naturalist Trusts, Woodland Trust, the Conservation Society, World Wildlife Fund and others in the hope that eventually they will be strong enough to confront Governments and demand supportive action from them.

Meanwhile, let us hope The Ecologist will continue to prosper — even although we can do nothing about the specific evils it reports, it does stiffen our mental sinews in making our own small contribution in the only way we can.

Yours faithfully,  
Mrs P. Lejeune,  
42 Church Road,  
Warlingham, Surrey.



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### DO YOU CARE?

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INSTINCTIVE NAVIGATION OF BIRDS, E. Gerrard, 1981, 180 pp, 105 diagrams, post free £4.50 (\$12.00) or send SAE for descriptive leaflet plus pamphlet on the Perdeck Saga revelations. The Scottish Research Group, Pabay, Broadford, Skye, Scotland.

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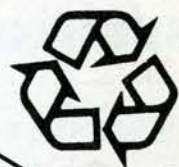
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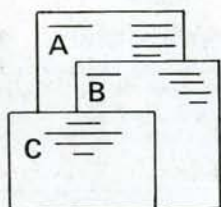
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