The Ecologist

Rethinking Basic Assumptions

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See inside back cover

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Editorials

The Thames Valley – a radioactive breeding ground for cancer

uman psychology is well adapted to evaluating risk. We do not do this probabilistically, but on the basis of best and worst case: thus we are prepared to spend money on a lottery ticket and chance winning a huge sum, even though we are well aware of the vanishingly small likelihood there is of our winning anything at all. By the same token, we will not take a risk, however infinitesimally small, if the outcome is death. People are not

impressed by arguments showing that the risk of fatal cancer per milliSievert dose of radiation exposure is five deaths per hundred thousand persons exposed even if such a number were guaranteed correct. The fact is, five people will die

Unlike Sellafield, there was no Irish Sea for Harwell's radioactive isotopes to be dispersed or diluted into. They were released as gases to the air, via a sewer to a local stream and via a pipeline to the river Thames at Sutton Courtenay.

> and one of them may be you! Would you allow your child to play in the park if there was a poisonous snake loose

somewhere within it, however tiny the probability of being bitten? What if the snake were invisible, and its bite caused cancer or leukaemia?

This is a lesson that the nuclear establishment apologists should have learned by now. Not that we were ever given the option of deciding. The invisible snakes were released from their wicker baskets in 1945 when the abomb was dropped on Hiroshima and they have been released ever since, from nuclear sites all over the

world, from atmospheric weapons testing, from accidents like Windscale, Three Mile Island and Chernobyl.



Sellafield Nuclear Power Plant. Children in the region are 10 times more likely to contract leukaemia.

"What does this have to do with us?" says Middle England, sitting outside at the 'Traveller's Rest'. Sweet Thames flow softly while I sing my song.

In 1983, the Sellafield leukaemia cluster was first reported. Children were ten times more likely to contract the disease near Europe's largest nuclear reprocessing plant. Attention was focussed on the other reprocessing plants in Europe; Dounreay in Scotland and La Hague in France. They turned out to have increased risk of eight and fifteen times the national averages respectively. Other nuclear sites in England and Wales were examined. West Berkshire, which contains the Atomic Weapons Research Establishment at Aldermaston and also the Royal Ordnance Factory, at Burghfield, also turned out to have a modestly elevated increase in childhood leukaemia, about 40 per cent higher than the national average.

All this was rather alarming, of course, and so the government set up a new, and nominally independent, committee to examine the possibility of a link between the radiation from the nuclear sites and the increases in the disease, a screamingly obvious association to the ordinary person. "No," said the independent Committee on Medical Aspects of Radiation in the Environment (COMARE) "radiation cannot be the cause because the levels are too low." "Hurrah!" cried Middle England and breathed a sigh. Interestingly however, the address of this committee is c/o The National Radiological Protection Board, Chilton, Didcot, Oxon. And anyone who has visited the site can tell you that Chilton, Didcot, Oxon, is also Harwell, the first and foremost site of the United Kingdom Atomic Energy Authority, and one of the first sources of radioactive man-made pollution in the UK.

Harwell, like Sellafield, has been releasing radioactive isotopes to the environment since 1948. However, unlike Sellafield, there is no Irish Sea for the radioactive isotopes to be dispersed or diluted into. They were released as gases to the air, via a sewer to a local stream, (the Lydebank brook which passes through the village of East Hendred)

and via a pipeline to the river Thames at Sutton Courtenay. Half a million tonnes of radioactive waste each year is pumped through this pipe. In the summer of 1980 when I explored the



Thames in my motor barge '*Nidd*', I remember mooring alongside a pipe mouth at Sutton Courtenay. I have a photograph of my daughters, then aged 14 and 15, diving into the river there; the sun shines brightly in the photo-

In the river, 100 metres downstream of the pipe, there are sediment Plutonium levels at 80Bq/kg. A mile downstream the figure is 32Bq/kg. The level for Plutonium should normally be zero.

graph. They are frozen in space together above their reflections, between the bank and the water surface. On my desk is a report of measurements made by Harwell scientists of radioactivity in the soil at Sutton Courtenay waterworks in 1996 showing levels of 4,800 Bequerels of radioactivity per kilogram of soil. This makes the mud considerably more radioactive than the 400 Bq/kg which defines low-level nuclear waste under

the Radioactive Substances Act 1993 and should mean that it has to be disposed of in a licensed site like Drigg in Cumbria. There are 4,800 radioactive disintegrations per second taking place per kilogram of this soil, 4,800 clicks on a Geiger counter per second, 4,800 primary energetic particles capable of smashing through living tissue, killing cells and

mutating cells, ultimately, perhaps, to cause cancer. In the river, 100 metres downstream of the pipe, there are sediment Plutonium levels at 80Bq/kg. A mile downstream the figure is 32Bq/kg. The level for Plutonium should normally be zero, but, because of the fallout from atmospheric testing in the 1960s it is about 0.05 to 0.2Bq/kg. Within a mile of the pipe end, National Power abstracts this radioactive water for Didcot Power Station and cycles the radioactive particles back into the atmosphere all over South Oxfordshire.

Drinking water for many local towns and villages is taken from the Thames, whose water is drunk in London too. Recent declassification of documents from the Public Records Office made it clear that the Metropolitan Water Board regarded with "great regret and dissatis-

faction" the original government decisions to permit the water to be contaminated by Harwell and Aldermaston with a nuclear cocktail of radioisotopes. Dr Charles Hill, for the Ministry of Housing, argued that there would be genetic disorders. He was overruled.

The river Kennet in

Berkshire is similarly affected by releases from the Atomic Weapons Establishment at Aldermaston (which also has a long pipe to the Thames at Pangbourne) and the Royal Ordnance Factory, at Burghfield. Aerial discharges from all three sites can be inhaled by local people, can fall on crops, become incorporated into food and/or be washed into the rivers. If we consider the 800 square kilometre triangular area between Oxford, Newbury and Reading as a sink for all this radioactivity, and compare the density of pollution, in Bequerels per square metre, with the pollution to the Irish Sea from Sellafield, we find that the latter pales in significance. Where can it go to? Will the Thames and Kennet wash it all away: through Wallingford, Goring, Reading, Henley, Marlow, Maidenhead, Windsor, Chertsey, Kingston, Richmond, Chiswick and through the Pool of London to the sea? Will this journey dilute it to a safe level? Is there a safe level?

One thing we can do to try to find out is to look at the cancer statistics for the areas involved, particularly childhood leukaemia. Our initial attempts to obtain leukaemia-incidence figures were consistently blocked by the Oxford Cancer Registry which opposed our access to the data. Perhaps this had something to do with the fact that the head of Oxfordshire Health Authority, Dr Peter Iredale, was, before his appointment in 1992, the Director of the Harwell laboratory. We had to buy mortality data from the Office of National Statistics and we used this to analyse deaths from child leukaemia in the areas of the county districts near the Thames and Kennet valleys above Reading. For the fifteen years between 1981 and 1995 the risk of dying from leukaemia in the 0-14 age group was 2.5 times the national average in the South Oxfordshire Thames valley. For the Kennet valley it was 1.9 times the national average. Of the seven county districts in the region, Oxford city, Cherwell, West Oxford, Vale of the White Horse, Reading, South Oxfordshire and Newbury, it was only the last two, those that received the

I wonder if my daughters were bitten by an invisible snake. There were no notices. I had no Geiger counter. How could I have known what the pipe was?

> radioactive discharges, that had significantly increased childhood leukaemia. We reported this result, together with measurements of radioisotopes recently made in the area, in the *British Medical Journal* in August, causing consternation and a great deal of media interest.

> In our letter we repeated our plea for a re-evaluation of the health effects of chronic exposure to low-level radiation from man-made radioactive pollution. These fission radioisotopes, Strontium-90, Caesium-137, Iodine-131, Tritium, Plutonium and so forth are substances that never existed on Earth before 1945. They mimic the very elements that life has evolved to use within cells. Yet they are unstable and radioactive. How, we ask COMARE, can they be compared with the effects of X-rays or natural background radiation? It is like comparing the energy absorbed as you sit and warm yourself in front of a fire with that transferred if you were to eat a hot coal. COMARE are not impressed. They con

tinue, like the law, to use the risk factors for radiation-induced leukaemia and cancer derived from the large single external exposure of the Japanese at Hiroshima.

The genetic damage caused by exposure to ingested and inhaled radioactive fission products does not only manifest itself as leukaemia in children. It is a cause of all cancers and many other illnesses including breast cancer and heart disease. Weapons fallout is arguably the origin of the present cancer epidemic.

I have been sent a cutting from the *Didcot Herald*. It gives an account of the funeral of a young man of 31 who

has just died of cancer. He was clever, enjoyed rock music, he worked at Harwell, went on to get a degree, but was made redundant. I wonder if he was bitten by an invisible snake. I wonder if my daughters were, or if I was, back in 1980 at Sutton Courtenay on the Thames? There were no notices. I had

no Geiger counter. How could I have known what the pipe was?

The nuclear project began in the atmosphere of the cold war. Perhaps we knew less then about the effects of low-level radiation than we do now. Now we no longer need nuclear weapons. Who would we drop them on? Nuclear power, it is now clear, is by no means "too cheap to be metered." The risks to us, to our children and to life on earth – the economic, environmental and social costs – are wholly unacceptable. It is time to outlaw nuclear pollution. We are right to be frightened of invisible snakes.

Chris Busby

Dr Chris Busby trained as a physical chemist and is an independent researcher on the effects of low-level radiation. His book *Wings of Death: Nuclear Pollution and Human Health* (1995) outlined evidence that radioactive pollution was the main cause of infant mortality in the sixties and contemporary increases in cancer and other illness, especially in areas of high rainfall.

Action

In 1996, Dr Busby helped found the Low Level Radiation Campaign which is presently engaged in opposing the transposition of the Euratom Directive in the United Kingdom. Through his membership of the European Committee on Radiation risk he is also engaged in a project to repeal the original Euratom Treaty of 1957, which called for the development of nuclear power throughout Europe. These campaigns are desperately short of person power and also funds. Anyone wishing to help in any way is invited to write to **The Low Level Radiation Campaign, Ammondale, Spa Road, Llandrindod Wells, Powys, LD1 5FY or telephone 01579 824771.**

Big Mac Attacks: Lessons from the Burger Wars

t least two conclusions can be drawn from the recently-concluded McLibel trial in England. The more inspiring of these is that individuals *can* successfully stand up to the corporate juggernaut, especially when they join forces with significant numbers of committed, like-

minded people across the world. David Morris and Helen Steel deserve credit not only for blackening McDonalds' eye, but for sparking the creation of the McLibel Campaign itself, which today links the many groups around the world

fighting similar but otherwise isolated battles. One can now read about and learn from anti-corporate activities in Canada, Norway, Malaysia, Poland, Croatia, India, the United States, Britain – and virtually everywhere else the franchised tentacles of the global economy have reached.

But the McLibel case also teaches us, once again, about the unequal distribution of power between citizens and corporations – those artificial entities modern laws consistently nurture and protect. Morris and Steel won a moral and tactical victory, and even convinced the court that the corporation exploits children, pays low wages, and falsely portrays its food as nutritious. But the fact remains that the legal ruling went

The rules of engagement themselves are so out of balance that the corporations are systematically given the upper hand.

> largely against the two activists. This comes as no surprise: when ordinary citizens are pitted against the full force of corporate power, the fight is hardly fair. Corporations like McDonald's are heavily armed – with skilled lawyers, media access, political connections, and even their own private police forces. More to the point, the rules of engagement themselves are so out of balance that the corporations are systematically given

the upper hand.

This was made abundantly clear here in Montpelier, capital of the state of Vermont, during a recent struggle to prevent McDonald's from opening a restaurant in the heart of the city's downtown. Even though the citizenry prevailed, the battle nonetheless

revealed the systemic bias that makes such outcomes the exception rather than the rule.

Montpelier is a small town with a little over 8,000 residents. It is not only the nation's smallest state capital, it is the only one without

a McDonald's – no small distinction now that golden arches span from Boston and Belgrade to Beijing and beyond. Montpelier is surprisingly vibrant for its size, and residents can still get virtually everything they need from locally-owned shops within the few blocks of the central business district. This is a rarity today in America, where corporate-dominated strip developments and malls have eaten away at



Karnataka State Farmers Association (KSFA) activists ransack the Kentucky Fried Chicken (KFC) outlet in Bangalore.

small towns like a voracious cancer. But Montpelier is not immune to the economic forces that spread this disease. The town already has two franchised fast-food establishments (Dunkin' Donuts and Subway), and the local pharmacy that had served people's needs for 40 years closed shortly after a national drugstore chain moved into town.

Unfortunately, most Montpelier residents seemed either resigned or oblivious to these changes. But McDonalds' plans to open a restaurant in a historic building in the heart of town evoked a powerful, visceral response: residents realized that their town, too, could easily become another down-

ward-spiralling cipher on the way to the corporate bottom line.

The initial Planning Commission hearing devoted to McDonald's was an inspiring example of spontaneous participatory democracy. Without prior organizing, hundreds of citizens packed the hearing room, carrying home-made signs and passing out hand-drawn cartoons and cardboard buttons. Many in the crowd were clearly angry and upset, and the issues they raised spoke to the heart of the destructive changes being imposed around the world: the loss of community identity as the planet is homogenized for the benefit of corporate producers and marketers; the reckless pursuit of economic growth at the expense of nature

and community; the increasing power and reach of the corporate juggernaut. Citizens wanted the Commissioners to consider the effect on the local economy of a business whose goal is to pump money out of communities and into corporate bank accounts. People linked local environmental issues - like the waste and litter fast-food restaurants generate - with more distant ecological damage, like the clearing of rainforests for cattle-ranching. People talked about McDonalds' strategy of

targeting advertising at young children, a practice which puts to rest the argument that consumers are "free to choose" whether or not to patronize the restaurant. Others pointed out how grossly inappropriate it would be to allow the premier icon of mass-produced convenience to put its plastic imprint on a building steeped in local history.

In a saner society, even one or two of

these arguments would have been more than enough to send the corporation packing. But with corporate libertarianism in ascendance, these arguments were not only insufficient, *they were irrelevant*. According to the rules by which we are governed, the Planning Commission was allowed to consider only a very narrow range of issues

In an ironic twist those opposed to McDonald's out of concern for people and the planet were effectively forced to defend the rights of the automobile – or they would be ignored altogether.

which, as it happened, centred around traffic and parking. One person asked, "Where *do* we raise these other issues?" No answer was forthcoming. In an ironic twist those opposed to McDonald's out of concern for people and the planet were effectively forced to defend the rights of the automobile – or they would be ignored altogether.

Nonetheless, the broader issues were still raised before the Commission – and in an even angrier tone once they were declared irrelevant. When a McDonald's representative referred to Montpelier as a "market", one resident shouted back, "We're not a market, we're a community!", a sentiment the crowd loudly cheered. As the night

To acknowledge the fundamental difference between a small locally-owned business and a transnational corporation is considered "discrimination"; to assess the impact of corporate chains on the local economy is "restraint of trade"; to make an issue of corporate advertising practices is an "infringement on free speech".

> wore on, testimony consistently shattered the myth that the public tacitly endorses the creeping corporate dominance of everyday life. (Not everyone concurred, of course. The City Council voted to send the McDonald's Corporation a letter of apology for the citizenry's "rude" behaviour, while the local newspaper was tireless in its cheer-leading for the corporation).

Though the Commissioners' mandate was limited to traffic and parking issues, they were clearly informed of the depth and breadth of public opposition to McDonald's. In subsequent hearings *ad hoc* citizens' groups limited their criticisms to automobile-related concerns – even going so far as to conduct their own traffic survey – thereby giving the

> Commission enough reason to turn McDonald's down based on the supposedly "relevant" criteria. Although McDonald's appealed, the Planning Commission's decision was upheld in court – one of the few times a recalcitrant community had won a decision against McDonald's in an American court of law. Through hard work and

some good luck, the citizens of Montpelier won a small battle against corporate domination. But they would be deluded if they believed they have won the war. McDonald's, Burger King, Taco Bell, Kmart, Staples, Home Depot, Wal-Mart and a dozen other corporate predators will be at the doorstep again tomorrow. If anything, the encounter with McDonald's revealed how vulnerable this and every other community are, and how little the law does to protect them from the corporate maw.

While Montpelier's criteria for assessing new businesses are woefully inadequate, the way the nation's laws are interpreted makes it effectively impossible to expand those criteria to

reflect citizens' real concerns. To acknowledge the fundamental difference between a small locallyowned business and a transnational corporation is considered "discrimination"; to assess the impact of corporate chains on the local economy is "restraint of trade"; to make an issue of corporate advertising practices is an "infringement of free speech".

As it stands now, corporations have more rights than ordinary citizens, and a

healthy environment counts for less than the smooth circulation of traffic. While corporations are running amok, the law effectively limits citizen opposition to counting parking spaces.

From the free-trade-driven international level all the way down to the local courthouse, the rules of the game are out of balance, and need to be righted. Instead of clinging to the myth that unregulated markets work in everyone's long-term interests, citizens should be allowed to nurture their local economy, to protect their environment, and to define the character of their own community. "Letting the market decide" is incompatible with allowing citizens actively and democratically to determine their own future.

There are, of course, other alternatives. While Montpelier citizens were considering the narrow range of options afforded them under the law, a farmers' group in Bangalore, India, ransacked a newly-opened Kentucky Fried Chicken outlet. They harmed noone, but demolished the corporate franchise inside and out.

Steve Gorelick

Action

For information on the McLibel Trial, campaigning against McDonald's and to send donations, contact:

McLibel Support Campaign 5 Caledonian Road, London N1 9DX, UK Tel/Fax +44(0) 171 713 1260, E-Mail and Listserve: <dbriars@world.std.com>

The McLibel Support Campaign is calling for a **Global Week of Action Against McDonald's** from 11th to 18th October 1997 (incorporating Oct. 11th - Kids Against McDonald's Day; Oct. 12th - Solidarity With McDonald's Workers; and Oct. 16th - World Anti-McDonald's Day).

The **McSpotlight Internet site (www.mcspotlight.org)** contains everything that McDonald's doesn't want the public to know (including the full transcripts of the trial, banned material, witness statements, scientific reports, cartoons, company documents, media reports, etc.). The site also contains campaigning materials (such as leaflets in numerous languages), a Debating Room providing a global forum for discussion and debate about McDonald's and all they stand for, and information on other multinationals.

The Burden of Literacy – a letter from India

et me state at the very outset, in no uncertain terms, that I am all in favour of achieving literacy but not unquestioningly and not without some concerns and reservations. I neither subscribe to the kinds of ghastly horror story that are associated with the word "illiterate"; nor do I share with unquestioning optimism that "literacy" per se will usher in a wealth-

ier and healthier society. Let me explain.

For one, we should never confuse "illiteracy" with "lack of knowledge, understanding or wisdom". We have seen the instance of a ten-year old tribal boy who could identify 275 varieties

of vegetation in and around his village, including 14 different types of grass. He was illiterate, but his knowledge about the plants, their characteristics, uses etc. was more than worthy of a doctorate in agriculture. His is not a solitary example, as those of us who have worked in rural areas will testify. This distinction is a critical one.

Secondly, we need to be clear about what literacy is and what it is not, what it can do and what it can't. Theoretically supposed to provide unlimited access to knowledge, information and data, which lowers the potential for being exploited, literacy has led to something quite different. Access has never guaranteed opportunity, availability or exposure. But, even if access does help, what kind of opportunity, availability or exposure

Any knowledge system that does not build on the collective wisdom of the past is bound to fall short of the demands placed upon it.

results, and for whom?

Thirdly, the mode, manner and method by which we are getting people committed to this campaign, and the haste with which we want to achieve it, raise doubts in my mind. Powerful sentiments like national pride are being whipped up in this endeavour. Should such a task be based upon a sense of guilt and shame? Will the ethics and values of the movement not influence the content? Should it not be based on respect, understanding and concern for fellow human beings and all life forms? The literacy campaign is an isolated one that in itself has no bearing on the larger issues of where our society is heading, much less 'how' and 'why'. I am worried about this style of functioning because it raises serious questions

regarding the real objectives – the hidden agenda – behind this drive.

Fourthly, it is vital we acknowledge that the modern economy, globalized and allconsuming as it is, and controlled by a small handful of oversized, unaccountable corporate forces, is wholly

dependent upon the existence and propagation of vast bureaucracies. The purpose of illiteracy-eradication programmes of recent years has been primarily for that end. In this light, does literacy help, or does it just change the nature of exploitation from an open attack to a silent, subversive type? We must therefore be aware of the limitations of what we are undertaking, instead of painting rosy pictures of it.



Turkana boys receiving an education far-removed from the reality of Turkana existence.

Have we ever paused to consider and reflect on the likely impacts of whatever we are attempting today, and the way we are doing it? Let me try. Literacy - the power of the written word - has displaced what was largely an oral tradition of knowledge transfer. When not handled with adequate sensitivity, it leads to the cannibalization of local wisdom, traditions and practices. Eroding knowledge-bases which have stood the test of time is extremely dangerous, especially for the poor with regards to their ability to cope with the immediate environment. And such intervention can and usually does create a superior/inferior ranking among knowledge systems. In the process, many traditional, ecologically-sound practices will be sacrificed

at the altar of literacy, even before we have a chance to assess them properly. Any knowledge system that does not build on the collective wisdom of the past is bound to fall short of the demands placed upon it.

There are some aspects of this process that need mention here, even if it be in passing. With the advent of literacy, the human memory is replaced by the book which itself is subsequently computerized. Are we upgrading therefore the capabilities of the individual, or are we increasing his or her level of dependence? The quality of knowledge itself also undergoes a transformation. From a local-specific, experience-based reality it takes on the quality of an abstraction, generalized and removed from personal reality. The drab commonalities of the larger environment are substituted for the richness of one's own surroundings. What was formerly being assimilated and internalized at the individual's rate of learning now becomes an impersonal race to keep up with others. An attitude of co-operation makes way for one of competitiveness.

One could elaborate on and pinpoint various such impacts, but I shall leave that for your introspection. I would only voice, derived from this, what in my opinion has been the reason why all attempts at illiteracy-eradication have failed miserably over the years. I believe that any attempt at literacy that is rooted in de-legitimizing, denigrating and demolishing a people's knowledge base can never gain open welcome. We cannot build on the ashes of people's accumulated experience and wisdom, nor trample on their self-respect and self-confidence. It is not by ridiculing and making them insecure that we gain acceptance. Strategies that do not incorporate this understanding, which do not respect and honour it, are bound to end up in wasted time and effort.

It is no coincidence, in my view, that of all the avenues into which corporate "charity" is being pumped, illiteracyeradication is among the most commonly frequented. Literacy has the potential to be used as another tool for opening up and increasing the reach of consumerism. Brainwashing people into such a culture, either directly or indirectly, will certainly be disastrous, as the process, by its nature, destroys the diversity of human culture, which in turn reflects the delicate and complex diversity of the natural world. We ought to be thankful to the developed nations for having shown us what mistakes we need not get into. If we have not learnt from their mistakes, we will be committing suicide in the long run. It would be wise to remember that those who do not learn from history are condemned to repeat it. Can we really cook up a worse scenario for ourselves?

What then should literacy aim at? Primarily, I would say that it should focus on the documentation and preservation of traditional wisdom. An oral tradition can now be transcribed on paper, as the very first step, before it is lost to posterity. We could do with a much greater emphasis on scientific understanding, as opposed to the narrow reductionism of today's scientific research. If we do not have the foresight, inclination or desire to build on the accumulated knowledge and wisdom of our people and to lend it the scientific and ecological credibility it so richly deserves, then at least we can refrain from destroying it, and consigning it to the dustbin of history. We could

use "literacy" as a basic tool for documenting it, so that generations yet to come will remain grateful to us. This is the least we can do for posterity and will establish the scientific and holistic nature of traditional wisdom and practices. Simultaneously, we must expose the many myths and superstitions on which modern science is based.

Let me close with an example in respect to such alternatives. Assume, for instance, that Vitamin A deficiency is a major problem. The moment we opt for Vitamin A capsules as the solution we are ensuring divisions among people: some can afford it, some cannot; others have access to it, others do not. Even those who can afford it and have access to it become dependent on an industrial complex to deliver it on its terms and

From a local-specific, experience-based reality it takes on the quality of an abstraction, generalized and removed from personal reality.

conditions. We are opening the gates for exploitation, discrimination and dependency. If, however, we opt to obtain the same through the humble drumstick, carrot, etc., then it automatically becomes accessible and affordable to everyone. One can grow it locally, thereby remaining independent of external forces. The route one chooses determines the kind of society we end up with; so, to that end, if literacy can provide the tools for discrimination,

then it has more than met expectations.

Finally, like most things, literacy carries within it the potential for much good, as well as the seeds of great destruction. What we choose to do with it will shape our future as humankind. Let us hope that wisdom and far-

sightedness will prevail over short-term expediency and personal profits.

Korah Mathen, Secretary, Samvardhan (Association for Propagation of Indigenous Genetic Resources, India)



Settlement on Kamarang River, Akawaio. Experience and local knowledge are passed from generation to generation.

The villages in Finland refuse to die

by Hilkka Pietilä

As late 'developers', Finnish people remember well pre-industrialized Finland and are able to recognize what has been lost to their detriment during the march of 'progress'. A strong Finnish village movement has consequently emerged with the aim of reversing rural decline, protecting their cultural identity and unhooking themselves from dependence on and vulnerability to the global economy. The movement has begun the necessary process of halting urban migration by defending, diversifying and boosting their local economies, de-romanticizing modern industrial society and simultaneously attempting wherever possible to raise the status of agriculture and rural community life generally.

F or 25 years people in rural Finland have been fighting to keep their villages alive in the face of economic development which has swept people from the villages to the cities and even out of the country.

It was in the mid-1960s that people started to move away from the villages in great numbers. It is estimated that in the years 1961-75 almost 500,000 people moved from the countryside to the urban and industrial areas, and nearly 200,000 of them emigrated to Sweden in search of a 'better life' and higher incomes.

Then the outflow started to decline, and in the late 1980s there were years when the reverse flow into the villages practically made up for it. During the recession the outflow was almost at a standstill, but with the 'economic recovery' in recent years it got under way once more with a vengeance.

Those who sought to preserve rural society and question the policies that were leading to its annihilation had an uphill struggle on their hands. Both political leaders and industrialists were concerned only with increasing Finnish economic competitiveness internationally, and therefore becoming as attractive a place as possible for multinational investments, on the principle that what is good for the big corporations is also good for the people.

The History of the Movement

It became fairly obvious some time ago, with young people moving away from the villages, with schools closing down, small shopkeepers going bankrupt, and local post offices being withdrawn, that village economies could not survive for long.

People realized that they could no longer count on the government to behave responsibly, and that they had to take matters into their own hands. The first move was the setting up of village committees in the western coastal area of Finland in the early 1970s. By 1980 a thousand had been set up. Five years later there was another thousand. Since then the movement has grown rapidly. There are now around 3,000 village committees and the number of people directly involved in running day-to-day activities in the villages is about 30,000. Their work has already had an appreciable impact on the lives of at least 500,000 people in rural Finland. It is the biggest people's movement in the country today.

Since the movement sprang from the grassroots, it takes a different form in each village. But there are a number of common fundamental goals:-

 To stop the migration from the villages by making them attractive, socially rewarding, and agreeable places to live in.

- To persuade people to move back and settle in the villages.
- To seek to create the conditions in which people can once again earn their living in their villages.

All other problems can be solved if these conditions are satisfied.

One of the most obvious difficulties was that there was practically no money available, but this was overcome by the highly motivated and very skilful people involved. They reactivated an old Finnish tradition of voluntary teamwork called *talkoot* as their secret weapon. Since the beginning people have devoted millions of hours of voluntary work to achieve their goals. This voluntary work turned out to be an effective substitute for the money that was not at their disposal. What is more, it turned out to be psychologically very rewarding.

Reversing Urban Migration

Municipalities were persuaded to buy land for newcomers. These were often sold at symbolic prices.

Talkoot has also provided a means of improving roads, and building sports grounds, boat harbours, jogging and skiing tracks, in order to make the villages more attractive to newcomers. *Talkoot* has made it possible to maintain small shops, schools, post offices, and other essential services. Volunteers also obtained the names and addresses of people who had moved away from their villages, in particular those who still have relatives or roots there. Many of these people were written to, urging them to come back and offering them inexpensive plots and services.

In most of the villages there are now premises for joint activities. Often an old schoolhouse is restored to become the Village House. In the village of Vähähaara, which is very close to my own village, there was no suitable building for that purpose, but the villagers found a large and beautiful farmhouse ten miles away, which they bought for almost nothing. They pulled it down log by log and moved each log to

Hilkka Pietila is an independent researcher and a long-term friend and promoter of the village action movement. She herself was born and grew up in a small country village and has seen during her lifetime the transformation of Finland from a rural, primarily agaraian country to the post-industrial, urbanized and computerized country of today. She was also a leading figure in the popular movement against Finnish membership of the European Union.

Vähähaara where they rebuilt the house very much as it was, though a little higher so as to provide the space for artisanal activities such as weaving. They also made the cellar a little bigger. This was achieved with no more than 3,000 Marks (less than £1,000). However, with all the work they put into it the village now had a house, which would have cost more than a million Marks if built in the normal way. This was done in a village which has a population of no more than 150 people. The tradition of talkoot made it possible not only to reconstitute this fine traditional building, but also to provide it with carpets, curtains, tablecloths, etc., which were either woven by village women or donated by various villagers. Now the main floor serves as a centre for a multitude of activities, including private and public festivals, meetings of the village committee and other associations, and as a place to receive visitors. There are enough seats to accommodate 150 people indoors, and outside there is a platform that can either be used as a stage for theatrical performances or as a dance floor. Viewed from the outside, the house fits in perfectly with the architecture of the village and looks as if it has been there for a long time. If one consults the Village House diary, one finds too that barely a day has passed without something happening there.

The movement has also done everything it could to keep village schools open. Needless to say, the school authorities predicted that the number of pupils would soon be so low that the schools would have to be closed. For instance, in Kuorevaara village the authorities calculated that the school would soon have no more than twelve pupils – far below the minimum number that would justify keeping the school open. However, they didn't count on the efforts of the villagers to keep the school alive. By 1990 there were actually 45 pupils at the school – that is three times more than predicted by the school authorities, and not only was the school saved but it now has three teachers instead of two.

Restoring the Traditional Culture

Whenever people are subject to serious stress they tend to regain their sanity by reviving their traditional culture. So it is not by accident that the reconstitution of local cultural traditions has played a big role in all village activities since the movement began.

In particular, villages have revived the old festivals and celebrations. They have put together collections of the tools that were once used by local craftsmen, and the clothes that their ancestors used to wear. They have held exhibitions of these traditional artefacts and have even created local museums. A great interest is being shown too in reviving the old handicrafts, such as weaving, spinning and traditional agricultural methods. Many of the village histories have been rewritten, by the villagers themselves, sometimes with the help of academics of local origin. Some have been very elaborate, including a history of the Mutkalampi villages – a group of three villages in central Ostrobothnia – which runs to over 500 pages with about 1,000 illustrations. It was published in 1985.

This shows how psychologically important it is for people to know something about their past, and in this way to create for themselves a real social identity. What is important is that all this has been done without any help whatsoever from the authorities, still less of course from the "developers" who, on the contrary, have often trivialized and discouraged all these activities, on the grounds that they serve no purpose – they are not "economically productive" and they do not contribute to economic growth!

Theatre Revival

The village communities have also revived local theatres.



"Claysmith" Hannu Sairanen, born, living and practising in Putikko village.

During the summer at least every fourth village has its own theatre. One example is the village of Kaivola in south-western Finland. This village has a theatre group called Suhina (which means sighing like the wind as it blows through the vanes of the mill). Originally the group was established to restore the old windmill on top of the highest hill of the village. That was in 1959. Since 1961 Suhina has run the summer theatre every year. The money they made in this way not only paid for the preservation of the mill, but also provided extra income for the village, enabling it to buy, among other things, twenty hectares of land for a Village House and housing sites for newcomers.

Another village, Rämsöö, has only about 80 households, yet it has run a summer theatre for years and is doing extremely well. It recently built a new stage and can now accommodate 350 people.

Last year the larger community of which it is part, Vesilahti, celebrated its 650th anniversary. Little Rämsöö village stole the show when it staged a famous play based on a very old Vesilahti legend – 'The Slaying of Elina'. This attracted an audience of about 3,500 people for the 17 performances they staged – even though it was an exceptionally rainy summer.

A very special one this summer was the Women's Music Festival in Vuorenkylä village in central Finland. The Vuorenkylä Society organizes a popular festival every summer, but this year it took a more ambitious form. It was co-organized with NaMu, the National Women and Music Association. All kinds of music, from classical to rock music, from church music to lullabies, composed and performed by women, was played at the festival. The idea of having a women's music festival in the remote village of Vuorenkylä brought a lot of life to the village and made it far better known to people throughout the country.

In recent years, women have gone in for completely new kinds of activity in various parts of the country. The most exciting women's group is 'Alkuvoima' (which means 'primal force'). It was set up in 1993 by young farmers in the southeastern corner of Finland with the aim "of maintaining the Finnish countryside as a viable and enjoyable environment for ourselves and our children". The members are mostly women farmers, but also include quite a lot of men. Alkuvoima's purpose is to combat what has become a general atmosphere of apathy. They go directly to the town market place to meet people, discuss, listen, teach, learn, share experiences, take part in debates, and develop new ideas. Their goal is to re-establish direct links between producers and consumers.

The young women farmers of Alkuvoima want to recreate the image and identity of rural women, and in so doing seek to raise the status of agriculture generally, while de-romanticizing the critical, yet commonly accepted, images of city life. They see themselves as modern young women with a good education, a multitude of theoretical and practical skills, and the desire to remain devoted to the preservation of their rural

culture. Alkuvoima received an important award in 1996 for their rural creativity, from the Women's World Summit Foundation. The prize money is to be spent on producing a booklet entitled 'The Philosophy of Alkuvoima – Joy in Everyday Life'.

It is not by accident that the reconstitution of local cultural traditions has played a big role in all village activities since the movement began.

Confrontation and Co-operation

The village movement is clearly a reaction against the tendency to see progress in purely monetary and material terms, and to promote it through industrialization and commercialization, without any respect for social and cultural values. The village people involved are fighting for a more balanced and humane form of progress which takes into account the rights of people to choose their way of life and live in small communities, closer to their roots, in a clean and natural environment. Their basic principle is "to build the present and the future on the foundations of the past". This is the slogan of the Vähähaara village development plan.

The local authorities, of course, see things quite differently. Not surprisingly, problems have arisen between villages and the municipal authorities. In some cases these have led to open confrontation. A case in point is the struggle of Sonkajaa village in the Illomantsi municipality on the eastern border of Finland, to retain their village school. It is a strong village with a self-confident population and ancient cultural traditions. The conflict over schools is a constant one in Finnish villages in general. In Sonkajaa this is the third time they have had to fight to retain their school. Now the municipality has decided once again to close the school. The decision is illegal, since according to their own regulations the minimum number of pupils in a school is 14, and there are actually 30 pupils at the Sonkajaa school. The villagers feel that they are faced with a violation of their human and civil rights. They have taken the municipality to court, but the judgement was against them on a purely technical point. Now they have appealed to the

Ombudsman of the parliament, the highest official to whom they can appeal. They are very confident that in the end they will win and that next year the school will once again be opened. In the meantime they are building a *tsasouna* (an Orthodox village chapel) as a *talkoot*

project, and will donate it to the Orthodox congregation - this the local authorities cannot prevent them from doing.

Another important example is Putikko village, which, in the 19th century, was a lively industrial centre in the very beautiful lake district of south-eastern Finland. Now the industry has gone, but the beautiful village remains with its picturesque houses, all of which are protected as historical monuments. The village has become extremely popular among artists from many countries, some of whom were born there, while others have adopted it as their second home. Putikko has 300 inhabitants in the winter and more than 600 in the summer, yet this beautiful place is under serious threat by developers. There is a master plan afoot to build an industrial centre right in the middle of the village. A pulp mill is to be sited in the lake on the edge of which the village is situated,



Moksi village school being successfully protected against the local policy council by village demonstrators.

and a 4,000-square-metre hotel is to be erected on the other side of the village. Needless to say, the villages are fighting these destructive projects tooth and nail and have sought support from their political and artistic friends from around Europe. So far this has not helped a great deal.

The most powerful proponent of this destruction is the manager of Punkaharju municipality. He refuses either to listen to the villagers, or even to look at any of the proposed alternative plans, all of which have been prepared voluntarily by the architect and planner friends of Putikko. He is convinced that the best thing for Putikko is to become an industrial and business centre. Unfortunately he is also Chairman of the Regional County Union, a position that gives him a lot of power and authority – and so the struggle continues, and so it must.

But there are other forces at work. In Sanki village of Utajarvi in northern Ostrobothnia, a village society was started only last year. In a short time it has really taken off, thanks partly to the local authority which has succeeded in obtaining considerable subsidies from the European Union for a development project involving eight villages.

The Sanki village society has played an important role in this development scheme since it signed a contract with the local authorities which makes it responsible for the provision of certain services, such as the setting up of day-care centres for children and catering for the health of the elderly. The funds are provided by the municipality. This scheme is very different from the ones we have described so far, as the people are actually paid to do the work rather than doing it voluntarily as has been done in so many villages in recent years. Much of the work is to be undertaken in this village by those villagers who are unemployed. All this appears very useful, but there is a cost to pay for it. The local authorities, not the villagers, are now financing the work, with a 60 per cent subsidy from the EU. This may not have the same effect in revitalizing village life and restoring people's traditional culture and self-identity, as when they do the work themselves on a voluntary basis. It could also discourage people in other villages from doing the valuable voluntary talkoot work which is being done in so many other parts of the country.

In addition, the money is provided with strings attached. It can only be used for certain purposes, which are not necessarily those which the villagers would like to see it put to. Many regard it as but another way in which the bureaucracy will be able to control local people. Finally, the money is only available for three years. What happens afterwards? Maybe its main effect will be to kill the *talkoot* movement in the village where it has been spent, possibly elsewhere too – recreating the very feeling of alienation, helplessness and frustration which prevailed before the village movement developed.

People of Scandinavia are privileged. We have big territories and small populations, plenty of clean land and water. In Finland, where industrialization is young and people still remember the past, real skills still exist – and so too does the knowledge of how to live in harmony with the natural world. These assets have provided the foundations for our ever growing village action movement, in which people are struggling to protect their culture and healthy standard of living without sacrificing their economic autonomy to the forces of the global economy.

Will people realize the great opportunity that they now have to lead a meaningful life in their rural villages, or will they be seduced by 'virtual' life in the big cities, with their hypermarkets, shopping malls, leisure centres and cultures of speed and squalor?



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Mad cow disease; the meat industry is out of control

by Jean Shaoul

"BSE was a calamity waiting to happen," writes the author in this excellent report on the reaction of the British government, its experts and the beef industry to an emerging epidemic. With the backing of crooked scientific evidence and non-research, the ever-more concentrated and monopolized beef industry has been able to lie and deny for years the truth about what has become a "catastrophe for the international food chain". Both the former and new governments have acted systematically to protect an industry whose interests, it is by now clear, are in direct conflict with those of the society they claim to represent. Every step they have taken to avoid the impending disaster has been designed either at best to accommodate an inherently unhealthy agricultural and economic situation and thus delay the inevitable or else simply to avoid the issue and dilute the justifiable fears of the public.

The new variant of Creutzfeldt-Jacob (nvCJD) is a terrible disease which, after a long gestation period, eats away at the brain tissue, leading to dementia and certain death. There is no cure. Like AIDS, it is a completely new type of infection. So far there have been 22 confirmed cases of nvCJD in Britain since 1986. However, this is likely to be an understatement of the total number of cases. More importantly, the number is set to rise.

On March 20th 1996, Stephen Dorrell, the Tory Minister of Health, announced in Parliament that 10 people under the age of 42 had died of nvCJD and that the "possible" cause was eating beef infected with Bovine Spongiform Encephalopathy (BSE).

This was the first time that the Government had admitted a link between BSE and human health. Yet BSE was first identified as a disease in cattle ten years previously and was known to belong to a group of fatal diseases (TSEs) which affect the brain.

Much was and still is unknown about the transmission and implications for

humans of the infective agent, thought to be a prion protein. BSE was, at that time, widely assumed to be the bovine equivalent of and derived from scrapie, a spongiform disease which has been found in sheep for several centuries – which meant that the disease was infectious and had crossed the species barrier. The implications for human health were immediately obvious.

But rather than take the necessary steps to contain and eradicate the disease, as had been the case with the foot-and-mouth epidemic outbreak in 1967, the Government began a systematic cover-up of the dangers. It claimed that the only forms of transmission were via scrapie-infected animal remains that were being fed to cattle and then through infected cattle remains which were in turn being fed back to cattle. It belatedly introduced on an *ad hoc* basis in July 1988 a series of bans which were aimed at preventing animal remains from being

Jean Shaoul is a lecturer in the Department of Accounting and Finance at Manchester University.

used for cattle and sheep feed and in November 1989 outlawed the use of bovine offal (SBO) in human food. It made no effort to enforce the bans despite evidence from its own committees, agencies and experts that the bans were not being implemented and/or were not being or could not be enforced. On the contrary, the endless recitation of the mantra "British beef is safe" was widely seen as a signal not to take the bans too seriously. The Government claimed that these measures would eradicate the disease but never carried out the necessary research to check whether the assumptions underpinning the bans were valid, stopped vital research from being carried out and victimized scientists who asked awkward questions.

BSE was a calamity waiting to happen. The rendering monopolies enjoyed full governmental support and MAFF praised PDM's efforts to minimise disruption to the meat industry.

waiting to happen. polies enjoyed full and MAFF praised inimise disruption industry. including inadequate financial compensation by the waiting to happen. research, the inadequacy of the steps taken to contain and eliminate the disease, and a systematic cover-up, BSE was not eradicated. Far from disappearing, the number of cases of BSE has continued to increase. Since 1986, there have been 170,000 officially confirmed cases of BSE. But for a variety of reasons, the steps taken to contain and eliminate the disease, and a systematic cover-up, BSE was not eradicated. Far from disappearing, the number of cases of BSE has continued to increase. Since 1986, there have been 170,000 officially confirmed cases of BSE. But for a variety of reasons,

As a result of the lack of

Government, the farmers were under pressure not to notify the disease and many cattle were killed before they showed the final symptoms of the disease. Furthermore, BSE spread to other countries.

Not surprisingly, recent research has confirmed the existence of a link between BSE and CJD, and so in parallel with the increase in cases of BSE has been the emergence of the human form, nvCJD. What the Government so confidently promised could not happen has, of course, happened. It raises a whole series of questions: how and why did all this occur, and whose interests does our government actually serve?

Changes in Agribusiness

The public's demand for cheap food and the lack of effective regulation have been blamed as the causes of the BSE/nvCJD crisis. The evidence shows that the disease developed alongside international pressures to cut costs in agriculture, food produc-

tion and distribution. In the late 1960s, more intensive methods of cattle rearing were introduced to increase milk yields, increase the proportion of lean meat and shorten the period before which beef cattle could be brought to market. This involved giving cattle protein-based compound feeds derived from animals.

In the late 1960s the traditional method of rendering down animal waste by wet digestion was replaced by a combination of solvent extraction to separate out the fat and high temperatures to remove the moisture (dry rendering). Both of these processes were costly. The use of solvents in the extraction process was phased out by the early 1980s, in part because they were a health hazard to workers. The Government's code of practice (DoE 1977) for the industry recommended the "regulation of temperatures to avoid overcooking" to reduce the risk of foul odours, and newer equipment was introduced which operated at lower temperatures.

But the dangers involved in recycling animal waste into animal feedstuffs were widely known and a committee of the Government's own experts warned:

"The major problem encountered in this recycling process is the risk of transmitting disease-bearing pathogens to stock and hence to humans."

(Royal Commission on Environmental Pollution 1979, p.150).

While it is known that the renderers kept temperatures at a level insufficient to kill humble bacteria never mind heat-resistant prions, from the perspective of the BSE crisis, there is no evidence that any of the methods used gave rise to a sufficiently high temperature to eliminate the infective agent.

But these changes in the processing methods did result in lower costs. This allowed British agribusiness to compete on the world markets, become a net exporter of red meat for the first time in 1994, dominate the world market in compound feeds and other agrochemicals, and increase its exports of processed food and drink. (Exports of compound feeds continued to increase long after they were banned in Britain.)

This in turn permitted the growth of ever larger corporations and monopolies which exercised considerable political power and influence. More than one third of the top 100 companies on the London Stock Market are involved in food and agribusiness. Food, drink, tobacco and agrochemicals have replaced heavy industry as Britain's most important manufacturing corporations. Of the 20 largest food and drink corporations in Europe, 13 are British. Let us now examine how the industry operates.

The Abattoirs

A handful of large supermarkets control more than half of all household sales of meat and meat products in Britain. McDonald's alone controls 8 per cent of the total beef market in Britain. This means that a small number of outlets exert enormous buying power over their suppliers, who are typically much smaller and very fragmented. This in turn means that the meat processors must squeeze their suppliers, the abattoirs. The abattoirs are caught between the rock of the supermarkets and the hard place of expensive livestock whose prices are kept well above the world price by a complex system of European Union (EU) subsidies and subventions determined by political horse-trading by national European Governments.

The abattoirs have a long history of public health problems going back before the war. Despite two committees of enquiry in the 1930s and the 1936 Public Health Act, things were so bad that when the Government took control of the food supply during the Second World War, it closed all but 600 of the 13,000 abattoirs and built new ones (Harris and Pickard 1979).

The largest abattoirs, which carry out most of the slaughtering, are owned by or have close partnership arrangements with the giant food corporations. They responded to the squeeze by dramatically increasing throughputs with no extra workers. It was not unusual for the production lines to be running so fast that workers had only two minutes per carcass, a problem highlighted in a recent report (Swann 1995) which was suppressed by the Ministry of Agriculture, Fisheries and Food (MAFF). Abattoir owners turned to less-experienced workers in an effort to reduce wages which for a very difficult, dangerous and responsible job were already well below the national manufacturing average. Little emphasis was placed on training, safety or hygiene.

The conditions of the buildings were such that more than one third of the abattoirs still had not met the 1992 EU building regulations by the end of 1995. Despite this the

The MMC knew that all was not well: and, to cover itself, called for a wider enquiry, in the full knowledge that the Government, which supported the increased concentration of the rendering industry, would ignore its call. The call for such an inquiry was indeed ignored. Government did not close them down as it said it would. While these regulations are not directly related to BSE, failure to comply makes it difficult to maintain basic hygiene. In such conditions, it seems inconceivable that the required separation and removal of specified bovine offal can have been done carefully and safely. From removal and staining for identification purposes to safe storage in separate,

marked bins for collection, a workforce working at such a speed and with the ultimate goal of maximizing profits would be unlikely to carry out the task with any significant care Not surprisingly, the rendering industry is replete with stories of 'things' found in the waste (Harrison 1992).

The inspection of the slaughtering process and the separation of the SBO has been rudimentary to say the least. Until 1995, meat inspection was carried out by the numerous local authorities with presumably varying standards of rigour. But in 1995 the inspection service was reorganized on a national basis as the Meat Hygiene Service. It became an executive agency within MAFF. But the meat inspectors were subject to the Official Secrets Act, had fewer powers than before to insist on satisfactory procedures, fewer staff and no equipment to test for bacteria and contaminated meat. There were 700 meat inspectors to cover 1,800 meat operators (MHS 1996a), yet the law requires that a meat inspector should be on site all the time while slaughtering takes place.

As recently as autumn 1995, nearly 50 per cent of the meat inspections checked by the State Veterinary Service in relation to SBO were faulty (MHS 1996a), with similar findings resulting from spot checks carried out at SBO collection centres (63 per cent) and knackers yards and hunt kennels (65 per cent). Six years after the regulations were introduced they were being widely flouted.

The Swann report, leaked to the press in its original form, noted that the meat inspectors, not the slaughtermen, were frequently expected to remove SBO and that the spinal cord was not fully removed from all bovine carcasses, which could lead to infection in animal feeds (Swann 1995). The final, expurgated edition, however, again perhaps unsurprisingly, claims that:

"SBO removal in the slaughterhall was carried out in accordance with the legislation" (MHS 1996b, p.13).

So the MHS, the government agency charged with enforcing the bans in the abattoirs, deliberately lied about its own role in permitting the spread of the disease.

The Rendering Industry

While 55 per cent of the carcass passes into the human food chain, 45 per cent of the carcass must be disposed of. It is the rendering industry which takes the waste. Almost all the waste is put to some commercial use. In 1992, sales of animal by-products totalled a massive £282 million.

There are a huge number of animal by-products. These include: casings for sausages; edible fats for margarines and cooking fats; gelatine made from bones, which is used in many food products and exported all over the world; tallow in compound feeds, soaps and oleochemicals; blood, meat and bonemeal for animal feeds and fertilizers; and various pharmaceutical products such as surgical sutures, insulin and hormones. The pharmaceutical products are particularly valuable.

The rendering industry in Britain exists, not as a collection and disposal service, but as a commercial operation utilizing almost every last ounce of the animal. While the commercial exploitation of animal by-products has always existed, this accelerated quite dramatically after 1960 with the development of new production techniques in the rendering industry and changes in the methods of animal livestock rearing.

The abattoirs must dispose of their animal waste within 48 hours of slaughtering, and preferably within 24 hours, or the local authorities will for health reasons order slaughtering to cease. Thus the disposal of animal waste is the absolutely crucial link in the meat chain. Failure to collect animal waste will bring the industry to a halt.

There is, however, no public provision for the disposal of animal livestock. Neither is there any provision for the disposal of dead and diseased livestock other than the knackers yards which carry out the slaughter and then pass on the waste to the renderers. So there is only the commercial service provided by the rendering industry which processes animal waste for commercial products. This means that farmers often get rid of their dead livestock by burying it illegally, dumping it on the roadside, down wells, etc., in ways which could contaminate land and water.

Thus, given the legal position, the renderers are in a very powerful position vis-à-vis the abattoirs. If they do not collect the waste, the abattoirs will be closed down. They have used their powerful position to charge the abattoirs for waste collection whereas previously they used to pay them for their animal waste.

And if that was not enough, two big monopolies began to dominate the rendering industry: Prosper de Mulder (PDM) in England and Wales, and Forrest, a subsidiary of the giant food conglomerate, Hillsdown, in Scotland. In 1985 PDM controlled about 35 per cent of the red meat waste. In 1993 it controlled nearly 65 per cent. The monopolies used their position for their own financial advantage: this little known sector is the most profitable within the entire food sector, with margins 30 per cent higher than in the food industry as a whole; 500 per cent higher than in the abattoirs and meat processors; more than double those of the giant supermarkets and 30 per cent higher than in the compounders which are big multinational corporations.

Government Agencies and Committees

And this was at the time when BSE was beginning to emerge. While the SBO had to be separated by the slaughterers, the renderers had to process it separately from other waste and dispose of it in landfill sites or by incineration. In 1992, the Spongiform Encephalopathy Committee (SEAC) upon which the Government had based its strategy, had stated

"BSE would be eradicated if all the controls were consistently applied and no other routes of transmission other than feed existed." (SEAC 1992).

Since they had already reported that the regulations had not been properly implemented, this was a cynical attempt to cover themselves.

It was MAFF's responsibility to enforce these regulations, and the fact that no attempt was made to enforce them was implicitly recognized by the Expert Group on the animal feedstuffs industry. This committee was commissioned as part of the Government's response to BSE. It reported that these bans:

"... are to a considerable extent dependent on selfregulation by the industry" (Lamming 1992, p.8).

That was in 1992. Yet MAFF had the temerity to say in 1996:

"Unfortunately, we now know that these bans were not strictly carried out."

The bans were not carried out because MAFF made no effort to enforce them. So not only was the rendering industry in a very powerful financial position in relationship to the abattoirs, it was able to take advantage of the BSE outbreak while at the



Cow carcass with suspected BSE infection being incinerated.

same time avoiding any onerous external regulation of its own operations. This was part of a wider initiative introduced by the Government to lessen the 'burden of regulation' on an 'overregulated sector of industry' (North 1993). It was reflected in a more 'flexible approach' and the end of 'over-zealous enforcement' by the enforcement agencies (CIEH 1992).

The increasing concentration of the industry was investigated by the Monopolies and Mergers Commission (MMC) which did nothing to stop the growing monopoly. But these little known investigations (MMC 1985, MMC 1991, MMC 1993) do provide a wealth of evidence about the unsavoury commercial practices in the rendering industry. Abattoirs were frightened to change to a different animal waste collector for 'fear of the consequences'. Where competition existed, PDM would charge very low prices in order to starve out the competition; otherwise, high prices were the norm.

More importantly, from the perspective of public health in general and BSE in particular, there was ample evidence that the different Government departments responsible for food safety, environmental health, waste and pollution knew that, irrespective of BSE, conditions in the industry were such that they posed severe risks to public health. Regulations were inadequate, not properly enforced and the rendering industry persuaded the Government to impose no further regulations. BSE was a calamity waiting to happen.

The evidence from the Government departments made it clear that the monopolies enjoyed their full support and MAFF praised PDM's efforts to minimize disruption to the meat industry.

"PDM itself claims to have saved the industry from disaster by persuading the authorities and the food compounders that meat and bonemeal should not be banned altogether from use as a source of protein in animal food" (MMC 1991, para 6.75).

The chief executive of the Hillsdown rendering subsidiary made the following statement in the company's annual report and accounts *after* the introduction of the ban on SBO in animal-based feeds:

"Meat and bonemeal prices have been relatively weak but customers in the feed compound industry have regained confidence in the products following the BSE scare and *demand is once again good*" (Strong and Fisher, 1991). [Emphasis added]

He made similar comments in 1993. No one thought to question why demand had recovered, who was buying the feed or why it could legally be exported. Yet a crucial part of the MMC's investigation involved examining the company's accounts.

The chief executive was clear that the MMC investigation posed no threat to the company:

"The result of this review [MMC] is expected by the end of 1993. We do not believe that either of our operations will be adversely affected." (Strong and Fisher 1992).

He was of course correct. The MMC concluded that the growing concentration in the industry posed no threat to the public interest.

But the MMC knew that all was not well:

"It is however a *fragile situation*" it admitted "that England and Wales should be so dependent upon one private company in connection with the provision of such an



Possibly infected cow heads and offal being separated for disposal.

important service as the collection and rendering of animal waste ...". (MMC 1991, para 6.82). [Emphasis added]

And, so, to cover itself, the MMC called for a wider enquiry, in the full knowledge that the Government, which supported the increased concentration of the rendering industry, would ignore its call. The call for such an inquiry was indeed ignored. The press did not mention the report or the call for an inquiry.

The Cover-up

How is all this to be explained? With the increasing economic power of the food corporations came a corresponding political power and backing from Government. MAFF stated quite categorically that it was "the sponsoring department for the rendering industry," meaning that it was responsible for ensuring that the industry was profitable because of its role in the meat chain (MMC 1985). In effect the Government was saying that financial considerations took priority over public health.

The BSE/nvCJD crisis exposes how these economic interests dictate the political and social policy of government, politicians, civil service and even the conduct of science. For 10 years the Tory government repeatedly denied any danger to humans from BSE. Their sole concern was to protect the profits of the beef industry. The real extent and significance of the BSE epidemic was played down.

Crucial to the cover-up was the part played by the various Government committees of scientific experts. They were staffed by people who could be relied upon not to ask awkward questions or go public about their concerns if they had any; who were experts in fields other than the relevant ones; and nearing retirement. They did not commission research which could test the vital assumptions upon which the Government's containment policy was based. Neither did they provide the evidence about the transmission processes within and between species, develop diagnostic tests, etc.

The reports ooze complacency and are riddled with contradictions. To take two examples. Firstly, the Government and its advisers attributed the spread of BSE to the changes in the rendering processes (lower temperatures and the elimination of solvent extraction) and based their belief on **epidemiological** data (SEAC 192). They did not carry out or commission **experimental** studies to test these hypotheses. Secondly, as has already been explained, all these committees were convinced that the chief cause of the spread of the infection was animal-based feeds, that the elimination of BSE depended upon the bans being properly enforced, and knew that they were not or indeed could not be enforced. Yet they expressed no concern and suggested no alternative strategies for the eradication of the disease. The Southwood Committee claimed, despite evidence to the contrary, that cattle were a dead end host with only a remote risk to humans (Southwood 1989). The Tyrrell Committee declared;

"the most pressing need is for more epidemiological research, including the collection of more and better data and improved analysis" (Tyrrell 1989), a message echoed by the Spongiform Encephalopathy Advisory Committee (SEAC): "We remain convinced that epidemiology must remain a high priority and believe that the current BSE epidemic provides a unique and challenging problem for epidemiologists." (SEAC 1992, p.8).

In other words, the number of people becoming ill with nvCJD should be monitored as though some giant experiment with human beings as guinea pigs was being conducted. Bodies such as the SEAC made soothing recommendations that fitted in with government policy. The expert committee set up to examine the whole range of animal feeds and advise on how the producers should be regulated voiced a number of concerns and recommended the setting-up of an independent animal feeding stuffs advisory committee. The Government

accepted all the recommendations and then promptly buried the report. (Lamming 1992).

At an enquiry into a planning decision relating to a rendering plant in Ashford, Kent, SEAC member Professor Almond testified that the committee had been

used by the Government to make statements on the safety of beef even as Dorrell was about to make his announcement. He said that, in saying that beef was safe, SEAC had assumed a species barrier between cows and humans of one to a thousand and did so because of the financial implications to the industry

"If we had used a species barrier of one to one, we would have had to live with the consequences that eating beef was dangerous. So we reluctantly arrived at a consensus on the evidence that does exist – a best guess. There were huge economic consequences one way or the other."

Public funding for applied and medical sciences in universities has become increasingly difficult to obtain. The Tory government's position was that since this was of benefit to industry, industry would fund it. Not surprisingly industry funded what would benefit the bottom line. University research is now heavily dependent upon grants from big business. Research workers are employed on short-term contracts with little protection from exploitation and few opportunities for training. This means that not only do they have no continuity of employment, there is little continuity in the direction and content of the research effort with all that that means for the development of scientific knowledge. Occupational and public health research suffered in the process. Anyone who asked awkward questions in public, like Professor Richard Lacey and Dr Harash Narang, were vilified, physically intimidated or removed from their jobs.

The Ever Wider Dangers

The failure of the Tory government to take prompt and wide ranging measures to eradicate BSE allowed an epidemic to spread throughout Britain, and now overseas via the export of animal-based feedstuffs and livestock. It announced a large scale culling of cattle over the age of 30 months (OTM). The purpose was not so much to eradicate the disease as to get the EU ban on exports lifted, reduce the reported incidence of cattle showing symptoms of the disease, and remove the excess supply of beef from the market. There is no scientific basis for selecting cattle over 30 months. BSE has been confirmed in cattle as young as 24 months. It simply corresponded to the age by which most cattle are killed anyway.

The ill-thought-out cull only intensifies the threat to public health. Of the 1.4m cattle that have been slaughtered, only about 4 per cent have been disposed of. The rest are piling up in cold storage. The so-called approved methods: some combination of rendering, incineration and landfill, carry further risks. Firstly experiments have shown that the BSE prions are not destroyed even at 1,500 degrees centigrade. Therefore, particulate matter is likely to be dispersed via emissions into the air over a one-mile radius of the incinerator. Secondly, the disposal of rendered carcasses in landfill sites carries the risk of land and eventually ground and water pollution. The backlog of carcasses waiting to be disposed of, and the storage costs entailed, increase the likelihood that the carcasses will

be disposed of illegally: by dumping and burial.

In addition there is the very real danger of groundwater contamination. Cattle blood and guts are routinely sprayed on agricultural land, as is sewage sludge and slurry. Blood and bonemeal products may still be used as

fertilizers for horticulture in greenhouses and gardens. These practices could contaminate the land. Particulate effluent from

practices could contaminate the land. Particulate effluent from the abattoirs enters the sewage system without adequate screening and could affect the water supply.

The Environment Agency, the very body charged with protecting the environment, has played a key role in covering up these dangers and nodding through these practices. It gave planning permission for the Canterbury Mills rendering plant to dispose of its effluent into the ground which is directly above an aquifer. It evidently calculated that the environmental damage and possible threat to public health was less than the financial costs to industry.

While the government denies any possibility of transmitting the disease between humans via blood, relatives of nvCJD victims are not allowed to donate blood and have also reported difficulties in obtaining dental treatment. Because of the long gestation period in humans, there is no way of knowing whether infected blood has already entered the blood banks. The possibility of maternal transmission in humans is not even discussed and results of tests carried out on the placenta removed from a nvCJD victim have not been released. Concerns also exist over the use of certain pharmaceutical products derived from animal by-products, and over surgical procedures and the possible risk of infection.

It is immediately evident from these few examples that the BSE/nvCJD crisis has huge and growing implications. Clearly there is a need for a major programme of research to investigate these and many other questions. But, without a doubt, the whole situation has been exacerbated by the Government's refusal to stamp out the disease in 1986.

Labour Government

There is no doubt that the political scandal could have brought down the Tory government. But from the very beginning the

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The Environment Agency, the very body charged with protecting the environment, has played a key role in covering up these dangers and nodding through these practices. Labour Party and the trade unions did nothing to alert the people to the dangers posed by BSE. When they finally did speak out after the March 20th announcement, they approached the crisis from the standpoint of the beef industry's profits via the euphemism of "consumer confidence" not the health of the public. The cause as far as they were concerned was government incompetence.

The Labour Party did nothing to further the appeals of the Trading Standards Officers in Northumberland who warned about the desperate state of meat inspection. It refused to raise the issue of BSE/nvCJD until a few months before the election in an attempt to make some cheap political capital out of it and distance themselves from the scandal when the EU threatened to reclaim the financial assistance given to the UK because of the Government's criminal negligence in the whole affair.

Since coming to power in May 1997, the Labour Government has tried to get the export ban on beef lifted, encouraged the burger bar outlets to use British beef and failed to enforce the bans on the export of British beef. They have proposed a new Food Standards Agency which will take two years to set up, is to be manned by civil servants from MAFF and the Department of Health rather than by independent experts and practitioners in the field, and whose recommendations will be advisory; BSE will be excluded from its remit.

The trade unions were virtually silent during the whole affair. Despite the fact that workers in the abattoirs were paid rates well below the national manufacturing wage and worked in appalling conditions which threatened public health, at no time did the unions concerned publicize the fact that it was impossible for their members to remove safely the SBO from the animal and human food chain within the prevailing conditions. Despite the fact that many of the Transport and General Workers' members work on the land, and in the food industry, abattoirs and rendering plants, the T & G said and did nothing when the crisis broke. The T & G's only call was for a public enquiry in order to restore confidence in the beef industry. Since then thousands of small farmers have lost their livelihoods, while tens of thousands of workers on the farms, and in the auctions, abattoirs, meat processing, etc., have lost their jobs. Now the T & G are sponsoring a conference, jointly with The Observer newspaper and the British Medical Journal. It is clearly targeted at the food industry since the registration fee is £700, and its purpose is to make policy recommendations to the Labour Government.

Public Policy Implications

Since the initial publicity in March 1996, there has been little public discussion of the crisis and measures that need to be taken to resolve it. In the circumstances it is only fair that full compensation should be paid to the victims of nvCJD and their families. Scientists who were victimized should be reinstated. All the files, research evidence and information on BSE/nvCJD must be made publicly available.

In the context of public health, it is vital that, until British beef is shown to be safe, it is withdrawn from sale with full compensation to the workforce. A full review of all regulations governing food and water safety should be carried out by a commission of scientists, experts and professionals in the field, completely independent of the industry and Government, to ensure the highest standards. Resources need to be made available for the implementation and 'zealous' enforcement of the existing and any new regulations. The reports of all inspections in the food industry must be a matter of public record and displayed prominently on the premises for all to see. There must be an end to secrecy, the use of the Official Secrets Act, the Animal Medicines Act and similar legislation aimed at silencing scientists and those charged with enforcement. The latest methods for slaughtering and bacterial monitoring should be introduced into every abattoir and meat producer. A full review of the whole system of disposing of animal waste, including the disposal of dead and diseased stock, needs to be undertaken. Corporations which cannot comply with these requirements should stand prepared to take responsibility for what will, according to Nobel Laureate Carleton Gajdusek, become in effect a genocide of unimaginable proportions.

The BSE crisis has been portrayed as a crisis for the British beef industry. But it is not simply a crisis for the British beef industry, or even the European beef industry, which it undoubtedly is, but more importantly a potential catastrophe for the international food chain. With every major agricultural producer using similar feeding techniques, there is not a country in the world that is exempt from the threat of diseases such as BSE. It is vital therefore that the wider public policy implications be addressed.

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Further information

The research on which this article is based was carried out for and in conjunction with the Workers Inquiry into BSE/nvCJD. The full report **"BSE: For Services Rendered? The Drive for Profits in the Beef Industry"** may be obtained from the author. More information about the inquiry may be obtained by emailing: <sep@dial.pipex.com> or contacting the Web Site: <http://www.socialequality.org.uk>

God protect us from those who "protect the skies"

by Simon Retallack

The Montreal Protocol celebrates its tenth anniversary this September. At the time of its creation, it was hailed around the planet as an historic example of the ability of mankind to forge collective solutions to environmental problems. Even today it is widely credited with having halted the destruction of the ozone layer. Such praise, however, is premature. For both the spirit and letter of the agreement are being flouted by profit-hungry corporations and black-marketeers who, regardless of the consequences to life on Earth, continue to engage in the highly lucrative trade in CFCs.

o safeguard public health, it is inadvisable to rely upon corporate morality or feelings of social responsibility. Any international agreement regulating business activity has to be legally binding and completely watertight. Regrettably, the Montreal Protocol is as ridden with holes as the ozone layer it was designed to save.

Under the agreement, as of January 1996, 'it became illegal for developed countries and their chemical companies to produce or import CFCs, except for limited 'essential' uses. However, there is one more notable exemption from this rule which renders the agreement as watertight as the *Titanic*. The Montreal Protocol permits Western chemical companies to produce CFCs for another ten years for export to developing countries, where production of CFCs is unlimited and will not be phased out until 2010. Even in 2010, these countries will be allowed to produce 15 per cent of their average production between the years 1995 and 1997 for "basic domestic needs".

Continuing CFC production

The loopholes, or rather chasms, within the Montreal Protocol, have been seized at by Western chemical corporations who continue to produce hundreds of thousands of tonnes of CFCs, rather than respecting the spirit of the agreement and the public will, and demonstrating social and moral responsibility by scrapping their production facilities. Prevented from selling CFCs to their home markets, they have simply shifted production from Europe, Japan and the USA to Latin America and Asia, while continuing to produce for export in several developed countries too.

The traditional leaders in CFC production, like the American companies Allied Signal and Du Pont, and the French company Elf-Atochem, all manufacture CFCs in developing countries and together are responsible for one-third of the world's ongoing CFC production.¹ In Brazil, Du Pont produces more than 10,000 tonnes of CFCs per year. In Mexico Allied Signal and a local company produce more than 15,000 tonnes of the chemical annually, and in Venezuela Elf-Atochem and a Venezuelan government-owned corporation produce 5,000 tonnes every year. Other transnational corporations have behaved similarly. Montedison of Italy, for example, built two CFC factories in Russia, whilst US companies Pennwalt and Stauffer constructed similar plants in India and Taiwan.

Corporations operating in these countries have actually been provided with a strong incentive to maximize production by the Montreal Protocol itself. The phase-out provision for



An advertisement from a Du Pont company brochure.

developing countries is based on an average of production in a given country for the period 1995 to 1997. Hence, the more that is produced in developing countries now, the more that will be allowed to be produced at these plants from the year 2002 into eternity.

Furthermore, far from having ceased domestic production, as most of the public in the developed world assumes, several of the leading Western CFC manufacturers are continuing to operate in at least three developed countries. Faced with a declining domestic market, these companies have callously shifted to production for export to the developing world. The chemical giant Allied Signal is able to produce nearly 17,000 tonnes of CFCs at its Weert plant in the Netherlands. Elf-Atochem owns and operates a CFC factory in Zaramillo in Spain, where it is able to produce nearly 9,000 tonnes of these lethal chemicals for export to developing countries and for 'essential use' within the European Union. In May 1996 an Elf-Atochem official admitted that the company planned to use these quotas to produce for "as long as permitted and is economically viable, corresponding to a need in developing countries." Such an irresponsible and self-interested attitude is also prevalent among the corporations which are allowed to continue to produce CFCs in the United States: Allied Signal, Du Pont, La Roche and Elf-Atochem. Although only Allied Signal has so far declared its intention to produce CFCs in the US after 1996, these companies may together produce over half a million tonnes of CFCs in the US between 1997 and 2005, once again for export to developing countries or for 'essential use' within the US, which is set to see its share of global production rise from 24 per cent in 1995 to 31 per cent in the years 1997 and 2005.

Much of the remainder of world production of CFCs is being met by China, which is producing over 50,000 tonnes a year, as well as by India and Russia. The latter's government has in fact stated openly that its corporations (currently manufacturing over 52,000 tonnes annually) might well exceed the quota of production permitted under international law. It appears that the Russian government is more concerned with

earning hard currency, generated by international sales of CFCs, than with its people's own skin. Hence, in the face of what many thought to be one of the world's greatest environmental victories, the scandalous production of CFCs still continues. The implications are far-reaching.

Fuelling a thriving black market

While production of CFCs persists, consumption in the West, though illegal, continues too. The reason is simple: the reckless production of CFCs by Western corporations, amongst others, is fuelling the flames of the world's black market in CFCs. Short-sighted corporate and consumer demand, and profit-hungry black-marketeers who supply it, do the rest. For in response to the imposition of the ban on the consumption of the chemicals in the West in 1996, CFC smuggling has become a highly lucrative trade, blossoming to the point where it ranks second only to illegal drugs in Custom Service seizures in many southern areas of the US.

The American-based pressure group Ozone Action, in a number of pioneering investigations, has unearthed a sprawling network of illegal operations and smuggling routes that leave many developed countries, which as signatories to the Montreal Protocol should be CFC-free, awash with the chemicals.

Thousands of tonnes of CFCs are still being produced.

Take the United States. From the West, CFCs made in Asia and Europe are entering California. From the North, CFC smugglers are following Prohibition-era smugglers' routes from Canada, even using old rum-running islands as storage points in the Great Lakes. But most notably, it is from the South that thousands of cylinders of the severely restricted chemical have been flooding in from Mexico into Texas and California. The vast open border is a gift to smugglers and makes quantifying the extent of the illegal trade extremely difficult. What is known is that since June 1996, customs agents in Laredo, Eagle Pass and Del Rio, Texas, have halted an average of five attempts to smuggle CFCs into the US each day. These seizures range from a few cans to dozens of cases. US Customs Service officials in

San Diego reported that they

seized 5,320 pounds of CFCs

along the California-Mexico

border alone in 1996. But this,

as with any smuggled sub-

stance, is likely to represent

just a small fraction of what

gally-imported CFCs should come as no surprise. Ozone

The source of these ille-

actually comes in.

CFC smuggling has become a highly lucrative trade, blossoming to the point where it ranks second only to illegal drugs in Custom Service seizures in many southern areas of the US.

> Action's latest investigation found that the vast majority of the CFCs entering Texas from Mexico are coming from a chemical plant called Quimobasicos not far from the border in the Mexican city of Monterrey. This plant, which churns out thousands of tonnes of CFCs every year, is co-owned by the US company Allied Signal. Without its continued production, the flow of CFCs towards the US would not exist. But its American owners know that Quimobasicos will benefit financially from the increased demand for another decade or more. The more produced in the developing world between 1995-1997, the more that can be produced through the year 2010. So the illegal trade will continue to be well-supplied.

> The US is of course not alone in this situation. Underground trade in CFCs has also emerged in the UK, Denmark, Hong Kong, South Korea and Taiwan, all of which have vibrant black markets. The European Chemical Council, an industrial lobby group, estimates that 10,000 tonnes of CFCs are circu-

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Only a tiny fraction of black market CFCs is ever seized by customs services.

lating in the European Union, probably more than in the US, given the lower black-market value of CFCs in Europe. Recent events confirm these suspicions. At the end of July 1997, customs officers across Europe and the European Commission uncovered a CFC smuggling racket which had imported 1,000 tonnes of CFCs from China worth millions of pounds.² 80 containers, each containing 12 one-tonne steel cylinders of the chemicals, had been imported through Rotterdam from China and their contents distributed around the continent over the

past year. According to British Customs, one UK broker had been involved in the deal. Taifun, a German company based near Frankfurt, is also alleged to be behind the smuggling operation. Their motive, needless to say, is quick and easy money.

These British and German companies are far from being isolated operators. Research

by Ozone Action indicates that a company called Refrigeration USA is engaged in about 3,600 tonnes of suspicious CFC trade with Belgium, the Netherlands, Portugal and Britain. In July 1996, *The Scotsman* newspaper reported a fax that had been sent by a marketing company in India to companies in Denmark. The Indian firm offered "unlimited supplies of CFCs", boasting that it represented "one of the largest integrated fluorine chemical plants in south-east Asia." The fax concluded: "Kindly fax us your monthly/annual requirements and interest ... awaiting your long-term business association." Several Russian firms operate similar services, shipping CFCs to the US via Eastern Europe, Britain, JFK Airport and the warehouse district of Miami, often with the tacit encouragement of the Russian government, in total violation of its Montreal commitment.

But if black-market suppliers exist, it is to meet the continued demand exerted by equally self-interested, myopic and irresponsible individuals and corporations. The US demand comes principally from the people who service the 80 million cars in the US that still use CFCs in their air conditioners. The cars can of course be retrofitted to use newer, ozone-safe chemicals, but the procedure is more expensive than using CFCs. It is suspected by US Customs officials that several major corporations are also involved in obtaining CFCs from the black market for similar money-saving reasons. The true price of such behaviour is, however, enormous.

Compounding the damage

With every pound of CFCs that chemical corporations continue to produce and black-marketeers sell to be consumed, about 70,000 pounds of ozone is destroyed. The damage done is already severe. The Northern Hemisphere experienced record levels of ozone depletion this past winter and spring as much as 40 per cent in some places. Measurements by British recording stations found levels of ozone over Northern Europe to be the lowest ever. The most recent hole over the Antarctic was as large as any on record - 12,000 square miles or twice the size of Europe - and it was certainly the longestlasting, opening as early as August and closing only in December. Last year NASA reported that there has been a substantial increase in UV-B radiation from ozone depletion over populated areas in the last 15 years. Over Britain, Scandinavia, Germany, Russia and Canada average exposure has increased 6.8 per cent per decade, and over Argentina and Chile the increase has been 9.9 per cent per decade.

Furthermore, scientists point out that the levels of ozonedestroying chemicals in the atmosphere will not drop below 'severe depletion' levels in the Northern Hemisphere until 2025; the hole over the Antarctic will not close until 2060. And that is based on the assumption of full compliance with the Montreal Protocol. The continued production of CFCs by Western corporations, estimated at well over one million tonnes over the next decade, and their black-market consumption, will push the much awaited recovery dates significantly further into

the future.

The appalling consequences of such a development for all forms of life cannot be understated and are worth reiterating. A sustained 10-15 per cent depletion of stratospheric ozone over several decades would cause increased exposure to UV-B radiation and an estimated 15-20 per cent

Chemical companies finance industrial lobbies like the Alliance for Responsible Atmospheric Policy to foster the illusion that CFCs are no longer produced and that the ozone layer is on the mend.

> increase in the incidence of skin cancer in fair-skinned populations and two million new cases of cataracts per year globally. UV-B radiation also suppresses the immune system despite pigmentation or the use of sunscreens. The effects on the health of animals are very similar. Trees, such as white pines and hardwoods, and plants, including crops like wheat and soya, are also damaged, with UV-B radiation leading to a reduction in leaf area, shoot length and ability to photosynthesize, and a fall in crop yields. Crucially, UV-B radiation

harms the productivity of phytoplankton, preventing it from absorbing the high degree of carbon that it normally does, which means that more will be left in the atmosphere to exacerbate climate change. The consequences of increased ozone depletion could not, therefore, be more serious.

Corporate morality

In the light of this, the continued production and sale of CFCs for profit is worse than criminal and should be dealt with accordingly. Given their devastating effects, no one should be producing CFCs, regardless of existing loopholes in international law. Yet when there are profits to be made, sanity, morality and social responsibility are discarded as naturally as a snake sheds it skin. The sad truth is that many corporations are so unscrupulous that they simply cannot be trusted to behave responsibly. They certainly cannot be trusted to tell the truth - instead they finance industrial lobbies like the Alliance for Responsible Atmospheric Policy to foster the illusion that CFCs are no longer produced and that the ozone layer is on the mend. Worse still, corporations like Du Pont have the gall to claim that they are "Protecting the skies". Corporations cannot even be trusted to produce safe alternatives to CFCs. HCFCs, for example, advertised as "environmentally enlightened" are ozone depleters as well as greenhouse gases, and are only somewhat less potent than CFCs. The United States, Japan and France continue to resist additional controls on their production. And yet there can be no excuse for the continued production of any of these chemicals - genuinely safer alternatives do exist for nearly every CFC application. But as long as CFCs and HCFCs are sold and marketed, the commercial viability of these safer alternatives is severely inhibited.

The way forward

As the world celebrates the tenth anniversary of the Montreal Protocol, it is only fair to recognize that without its existing measures, the state of the ozone layer would certainly be much worse. But the agreement clearly leaves gaping omissions, not only in respect to CFCs but also to methyl bromide, another potent ozone destroyer used as a pesticide and fumigant, which is virtually unregulated by the Montreal Protocol. And so despite the widespread public belief that the Protocol has halted ozone depletion, Montreal was clearly only a beginning.

Governments should be using this anniversary to complete the battle and stem the tide of ozone-depleting chemicals by closing the valves at the source – at the world's remaining CFC factories. For as long as the holes in the Montreal Protocol remain unplugged, as long as CFC plants continue to operate, no matter what customs and intelligence agencies do, the sale of these chemicals will continue to flourish and the hole in the ozone layer itself will expand far into the future.

Notes and References

- All figures and quotations used in this article come from Ozone Action, other than where indicated.
- 2. 'Banned CFCs' racket broken', The Independent, 1.8.1997.

Action

This article is based largely on the research of ozone Action, a national public interest group focused exclusively on atmospheric protection in the United States. It has published two reports on the black market for CFCs, conducted a scientific roundtable on methyl bromide and provides information for the public about ozone depletion. More information is available on their web site at http://www.ozone.org

Du Pont – World Leader in Ozone Destruction

Du Pont invented chlorofluorocarbons (CFCs) – the primary chemicals responsible for ozone depletion – and has in the past accounted for as much as 25 per cent of the global CFC market. Stratospheric ozone protects life on Earth from harmful ultraviolet radiation. The United Nations Environment Programme (UNEP) conservatively estimates that the current level of ozone depletion will cause at least 300,000 additional cases of skin cancer, including malignant melanomas, and about 1.5 million additional cases of cataracts annually. Human immune system suppression, damage to crops, and decreases in the phytoplankton population at the base of the marine food chain are also highly likely.

A look at Du Pont's history with the CFC and ozone issues is the most telling evidence of the company's greenwash efforts:

- 1928 Du Pont/GM scientists invent CFCs.
- 1974 Scientists link CFCs to ozone destruction. Du Pont pledges to stop production if proof is found.
- 1975 White House Task Force finds CFCs "cause for concern". Du Pont warns against "acting without the facts."
- 1978 US Environmental Protection Agency (EPA) and Food and Drug Administration (FDA) ban non-essential CFC aerosols. Du Pont continues selling CFCs for aerosols abroad.
- 1979 National Academy of Sciences warns that continued CFC use will lead to 16.5 per cent ozone loss. Du Pont says: "All ozone depletion figures to date are based on a series of uncertain projections."
- 1980 Du Pont takes lead in forming the Alliance for Responsible CFC Policy, an organization which has helped stall a CFC phase-out.
- 1981 NASA satellites confirm ozone decline. Du Pont discontinues most research on CFC alternatives.
- 1985 Scientists discover ozone hole over Antarctica. Du Pont expands CFC production in Japan.
- 1987 Scientists confirm CFC role in Antarctic ozone depletion. The Montreal Protocol cuts CFC production by 50 per cent. Du Pont says: "We believe there is no imminent crisis that demands unilateral regulation."
- 1988 Scientists report ozone depletion over temperate zones. Du Pont announces phase-out of fully halogenated CFCs, but without a firm timeline.
- 1989 Ozone damage over Arctic reported. Helsinki Declaration strengthens Montreal Protocol and orders phase-out of CFCs by 2000. Hoechst company announces 1995 target date for unchlorinated CFC substitutes. Du Pont lobbies against faster phase-out of CFCs.
- 1990 Ozone hole opens over Antarctica for 12th straight year. Ninety three nations agree to strengthen Montreal Protocol. Du Pont receives "stratospheric protection award" from US EPA.
- 1991 With new data, US EPA projects 200,000 additional skin cancer deaths and 12 million skin cancers over 50 years from increased ultraviolet radiation. Du Pont blocks shareholder resolution calling for phase-out by 1995.
- 1992 Inevitability of northern hemisphere ozone hole confirmed. Du Pont buys full page ad in the New York Times saying "we will stop selling CFCs as soon as possible," but only "in the US and other developed countries."
- 1993 Measurements show that global levels of ozone hit a 14-year low; the data indicate that the amount of ozone in the northern hemisphere is less than scientists had predicted.
- 1995 Scientists who first linked CFCs to ozone destruction win Nobel Prize in Chemistry. According to the UN World Meteorological Organization, the hole in the ozone shield over the Antarctic covered an area twice the size of Europe at its seasonal peak and grew at an unprecedented rate in 1995.

Adapted from "Hold the Applause", Greenwash: The Reality Behind Corporate Environmentalism by Jed Greer and Kenny Bruno, Third World Network, Penang, Malaysia, 1996.

Synergistic Effects of Chemical Mixtures – Can We Rely on Traditional Toxicology?

by Dr Vyvyan Howard

Recent research has shown that the synergistic effects among chemicals used in different combinations is much more dramatic than was previously thought. Yet we continue to test chemicals for their possible carcinogenic or mutagenic potential in isolation from each other. This procedure can no longer be justified. To determine their real effect, we need to test chemicals in all their possible combinations, which is both logistically and financially impossible. As the author has pointed out, "to test just the commonest 1,000 toxic chemicals in combinations of three (at a standardized dosage) would require at least 166 million different experiments." Can we solve the problem other than by drastically reducing the number of chemicals to which we are exposed?

Lassical toxicology approaches the study of chemical substances one at a time. The incidence of a given toxic effect can be plotted against dosage to construct a 'dose response curve'. From such a curve it is sometimes possible to decide if there is a safe level of exposure to a particular chemical. Now there is a new problem. We have in our bodies today what is estimated to be between 300 and 500

chemicals that simply would not have been there 50 years ago, because at that time they did not exist or were present in the environment at undetectable levels. Trying to work out the toxicology of such a complex mixture presents many problems and renders the classical approach (of examining chemicals one at a time) quite useless.

The chemical industry received some bad news last June. *Science* magazine published a new study showing that some combinations of hormone-disrupting chemicals are much more powerful than any of the individual chemicals by themselves.¹ *Science* magazine is the conservative voice of mainstream scientific thought in the US. Until then *Science* had largely ignored the possibility that industrial chemicals may be interfering with hormones in wildlife and humans. The study showed that combinations of two or three common pesticides at low levels that might be found in the environment, can be between 160 and 1,600 times as powerful as any of the individual pesticides by themselves. It further demonstrated that one chemical, chlordane, which has no ability to disrupt

hormones by itself, neverthe-

less greatly magnified the

ability of other chemicals to

formally withdrawn by the

authors because it has not

been possible to reproduce

the results, a step which is to

be applauded as an act of scientific honesty. However, the

danger is that there will be a

That paper has now been

disrupt hormones.

We have in our bodies today what is estimated to be between 300 and 500 chemicals that simply would not have been there 50 years ago, because at that time they did not exist.

> tendency by some to say that synergism between chemical pollutants is no longer a problem. Nothing could be further from the truth. There are a number of studies from different labs indicating synergistic enhancement of mixtures of up to 10 times the individual effects, for example.² The environmental protection apparatus of the UK and, indeed, the world, is at present based on studies of individual chemicals acting alone.

> It is worth noting that nature has assiduously *avoided* evolving the capability to synthesize certain groups of chemical compounds. For example, in the whole of vertebrate phylogeny there have been no biochemical pathways developed for the synthesis of higher chlorinated or perchlorinated organic molecules. The fact that a few plant species can produce, for example, organo-chlorines, mainly as self-protective biocides, tells us that nature would have been perfectly capable of evolving this chemistry in the mainstream of animal evolution. The fact that it didn't should warn us that their

Dr Vyvyan Howard is a developmental toxico-pathologist at the University of Liverpool. He has developed a number of sensitive toxicological tests involving 3-D measurements with microscopes (termed stereology) which are now being used for testing pharmaceutical agents prior to licensing. These tests are currently being applied *in vivo* to study the effects of certain environmental hormone-disrupting chemicals. Assays such as these may well form part of a suite of routine screening tests for the objective hazard assessment of hormone-disrupting chemicals in the future. Dr Howard is currently the President of the Royal Microscopical Society and is a Member of the Royal College of Pathologists.

The environmental protection apparatus

of the UK and, indeed, the world,

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individual chemicals acting alone.

introduction into the body is likely to be damaging!

We now see a global distillation of such chemicals as a result of bulk production by the chemical industry. These compounds, which are persistent and fat-soluble, accumulate in the body as life progresses and can be passed on to the next generation across the placenta and in breast milk. It should not surprise anybody to learn that these chemicals have untoward effects. If the biosphere is flooded with organic molecules that nature has specifically eschewed, then harm will almost inevitably follow, particularly when many of them are designed to be toxic – for example, pesticides.

Hormones are natural chemicals that act as messengers, travelling through the blood-stream, regulating various bodily

processes, co-ordinating the body's activities to maintain health. Hormones are particularly important during growth and development of an egg, an embryo, a foetus, an infant. About 100 different hormones have now been identified, and they control growth, development and

behaviour in all vertebrates (fish, birds, reptiles, amphibians and mammals), including humans.³ Disrupters of the endocrine system are not like most 'toxins'. With the latter there is usually a concentration below which the toxic effect cannot be detected. The endocrine system can be likened to a 'running motor' which is set at an equilibrium that has taken many millennia to evolve and stabilize. Any disrupting influence can only 'up regulate' or 'down regulate' the system and thus there will not be a 'zero effect' dose level.

Since 1991, studies have shown that at least 50 synthetic industrial chemicals can interfere with hormones and disrupt normal growth and development in birds, fish, mammals, reptiles, amphibians and humans.⁴ The results of such interference can include changes in sexual preference and behaviour; reduced gonad size; diminished sperm count; various cancers;

nervous system disorders; birth defects; and damage to the immune system, among other effects. Many of the 50 hormone-disrupting chemicals are commonly found in detergents, plastics and pesticides. In response to these studies, the chemical industry has asserted that low-level environmental exposures are not powerful enough to affect humans.⁵

The idea that common industrial chemicals may be interfering with the hormones of wildlife and humans has far-reaching implications. If it is true, it means that the chemical industry, as we know it, poses a threat to a great many forms of life on Earth and the majority of the higher animals. How can we learn whether this is true?

Chemicals with vastly different molecular structures have proven to be hormone disrupters.⁶ This means that a chemical's ability to disrupt hormones cannot be discovered simply by examining a diagram of the molecule, and therefore the study of so-called structure/function relationship is not helpful. Thus, thousands of chemicals will need to be tested individually for their ability to disrupt hormones. A thorough battery of tests has not yet been devised, and there are now 70,000 chemicals currently in commercial use, with about

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1,000 new ones added each year. The prospect of testing the toxicity of this number of chemicals, even individually, is daunting. No one knows where the resources would come from to conduct such a large number of tests.

If scientists have to study *combinations* of chemicals, their job is vastly increased.⁷ For example, to test just the commonest 1,000 toxic chemicals in unique combinations of three would require at least 166 million different experiments (and this disregards the need to study varying doses).⁸ Even if each experiment took just one hour to complete and 100 laboratories worked round the clock seven days a week, testing all possible unique three-way combinations of 1,000 chemicals, it would still take over 180 years to complete!

> This is not the first evidence that some combinations of chemicals are more powerful than any of their individual chemicals. Earlier in 1996 researchers at the Duke University Medical Centre published a study of three chemicals to which US soldiers were exposed during

the Gulf War. None of the three chemicals by itself caused nerve damage in laboratory animals, but together the three chemicals showed powerful nerve-damaging effects.⁹

Even earlier, studies had shown that exposure to radiation enhances the toxicity of certain chemicals,¹⁰ and that tobacco smoke and asbestos enhance each other's toxicity.¹¹ However, no routine toxicological tests of chemical combinations to assess chemical dangers are performed or required by regulatory authorities. For example, the US National Research Council (NRC) recently studied the problem of doing "risk assessments" for combinations of chemicals. The NRC concluded that simply adding up the individual toxicity was the way to handle combinations. NRC said this approach would underestimate the toxicity of combinations of chemicals no more than 10-fold,¹² an approach supported by the Health and

To test just the commonest 1,000 toxic chemicals in unique combinations of three would require at least 166 million different experiments (and this disregards the need to study varying doses). Safety Executive. To date, no studies have looked at more than about five different chemicals in mixtures for the demonstration. However, we have hundreds of xenochemicals in our bodies and the levels of synergism possible within such complex mixtures remain unknown.

Yet more worrying is the concept that, if these chemi-

cals can potentiate each other, then they may be able to potentiate our own naturally occurring endogenous oestrogens or phytoestrogens (plant oestrogens) which occur naturally in bulk in the diet. This hypothesis has yet to be tested, preferably on the *in vivo* models that a number of scientists (including this one) are working on. However, if synergism between xenoestrogens and natural oestrogens were shown to be a fact, then it could provide an explanation for much of what is being observed in human and wildlife populations and at relatively low levels of potentiation.

It is hard to imagine a practical, manageable testing programme that can sort through these problems and produce reliable, comprehensive results in less than a century. By that time, if damage is being done now, as many scientists believe is the case, it will be far too late. At the present time we only have precaution to rely upon.

Why man-made chemicals must be regarded as guilty until proven innocent

It took several thousand million years of evolution for the biosphere or world of living things, of which we are an integral part, to take on the shape industrial society found it in, and thereby provide an ideal habitat for humans and the myriads of other forms of life that compose it.

During the course of this evolution, as Barry Commoner puts it:

"The chemical, physical and biological properties of the Earth's surface gradually achieved a state of dynamic equilibrium, characterized by processes which link together the living and non-living constituents of the environment. Thus were formed the great elementary cycles which govern the movement of carbon, oxygen and nitrogen in the environment, each cycle being elaborately branched to form an intricate fabric of ecological interactions. In this dynamic balance, the chemical capabilities of living things are crucial, for they provide the driving force for the ecological cycles; it is the chemistry of photosynthesis in green plants, for example, which converts the sun's energy to food, fibre and fuel."

The biosphere can function as a self-regulating natural system and maintain its basic structure, on which the very survival of its living components depends, only if the critical interrelationships between all its components – at all levels of organization, including that of the atom or the molecule – are maintained.

As Commoner further points out "... the chemical processes which are mediated by the biochemical system represent an exceedingly small fraction of the reactions that are *possible* among the chemical constituents of living cells. This principle explains the frequency with which synthetic substances that do not occur in natural biological systems ... turn out to be toxic."

Commoner illustrates this principle thus:

- "(a) Of the approximately one hundred chemical elements which occur in the materials of the Earth's surface, less than twenty appear to participate in biochemical processes, although some of those which are excluded, such as mercury or lead, can in fact react quite readily with natural constituents.
- (b) Although oxygen and nitrogen atoms are common in the organic compounds found in living systems, biochemical constituents which include chemical groupings in which nitrogen and oxygen atoms are linked to each other are very rare.
- (c) Although the numerous organic compounds which occur in biochemical systems are readily chlorinated by appropriate artificial reactions, and the chloride ion is quite common in these systems, chlorinated derivatives are extremely rare in natural biochemical systems.

It is no coincidence that these chemicals are not found in living tissues. There is good reason for it. The organization that is the biosphere, has

Risk assessment – an example to illustrate the inadequacy of the approach

For a risk assessment to be meaningful there must be a full understanding of all the factors involved. For building a structure, such as a bridge, it can be seen that the majority of factors involved can be accounted for. However, with something as complex as the environment coupled with human health, to assume that everything is understood is as unrealistic as it is arrogant. Therefore, model assumptions have to be substituted for imponderables. Any risk assessment is only as good as its assumptions. As these can rarely if ever be verified, the public is offered 'fact-free' models in risk assessments, which can be used to prove literally anything. They are then dressed up in a highly technical language, which makes them incomprehensible to all but a few 'experts', and offered as reassurance that all is well. been able to evolve at the expense of eliminating possible reactions between these substances and living things. If any living systems once included them, then they have been eliminated by natural selection.

The consistent absence of a chemical constituent from natural biological systems is an extraordinarily meaningful fact. It can be regarded as *prima facie* evidence that, with a considerable probability, the substance may be incompatible with the successful operation of the elaborately evolved, exceedingly complex network of reactions which constitutes the biochemical systems of living things."

Furthermore, such theoretical considerations can be confirmed empirically.

Thus mercury is one of those eighty elements not essential for living processes. There is at least one good reason for this. Biochemical systems have evolved a system of enzymatic catalysis in which sulphur-containing groups play a crucial role. These react with mercury introduced into a living system, and enzymes are inactivated, often with fatal results.

There is also a good reason why synthetic nitroso compounds in which nitrogen and oxygen atoms are linked do not occur either in living tissue. they appear to interfere with the reactions involved in the orderly development of cells, and give rise to cancer and mutations.

There is also a good reason why synthetic organochlorine compounds such as DDT and PCBs are excluded from living tissue. They are often very toxic or produce long-term damage such as cancer.

How does a living system succeed in excluding unwanted chemicals? The answer is that either these chemicals are not present in its environment in that form which would permit them to interfere with it, or the system develops subtle homeostatic mechanisms for maintaining low levels within it, even if the levels outside are higher. These mechanisms, however, have developed via the evolutionary process hence very slowly. They can only deal with chemicals found in that form and at that level to which the system was exposed during its evolutionary experience. In general the more the environment changes as a result of human activities, the less does it resemble that in which we evolved, and the less efficiently can our normal behavioural mechanisms enable us to adapt to it. Thus, while the human liver is capable of detoxifying those chemicals that it has learnt to detoxify over millions of years of human evolution, it is incapable of detoxifying chemicals to which it has not been exposed during this period.

It is these considerations which led Professor Stephen Boyden of the Australian National University to formulate his principle of phylogenetic maladjustment. He pointed out that since the evolutionary process is adaptive, it must be when subjected to that environment with which we have co-evolved that our biological needs are best satisfied. This means that any modification of our environment causing it to divert from that to which we have been adapted by our evolution must lead to phylogenetic or evolutionary maladjustments and the greater this diversion the greater these maladjustments must be.

This is an extract from *The Great U-Turn* by Edward Goldsmith. Green Books, Ford House, Hartland, Bideford, Devon, UK.

When regulations for public protection from industrial air pollution were first drafted they were concerned with acute exposure to irritant chemicals. The method was to observe clinical effects such as acute respiratory distress, referral rates to hospital, prescription rates for various medicines as indices of the sensitivity of local receptors to a number of measured levels of known irritant pollutants.

Initially this approach was applied to coal-based products of combustion, mainly with respect to the oxides of sulphur. With the passage of time and the increasing use of oil products and various combustion processes, the emphasis has moved to consider the oxides of nitrogen and ozone, as well as sulphur oxides. The above-mentioned irritants have the common properties that they are transient in the environment and they do not accumulate in the body. As the ambient level in the environment rises and falls so the level in the bodies of those exposed mirrors these movements. None of the three chemicals by itself

caused nerve damage in laboratory animals,

but together the three chemicals showed

powerful nerve-damaging effects.

With such a system it is quite logical to protect the public by imposing limits to the allowable environmental levels, set by reviewing measurable clinical events in the population. For non-bioaccumulative, non-persistent pollutants this approach could work adequately, provided the following caveats are observed:

- (a) the average background ambient levels for each pollutant from sources in the locale are known and taken into account:
- (b) any synergistic or additive effects of the mixture of pollutants are considered; and
- (c) any idiosyncratic feature in the health pattern of the local receptors. For example, an increased incidence in obstructive airways disease.

For substances that persist in the body, even after the environmental level has fallen, the approach of simply setting

emission limits is unlikely to succeed in protecting human health, and indeed for a number of organochlorine pollutants can be seen to have already failed us. In all risk assessments to date, the implicit assumption is made that the population about to be polluted is 'clean': that is

to say, has no body burden of pollutants and therefore is safe to be exposed.

In the case of dioxins, nothing could be further from the truth. The Health Council of the Netherlands has recently published a report¹³ which considers that a proportion of the Dutch population already contains body burdens of dioxins that are causing measurable effects on new-born babies' brain development, immune status and thyroid metabolism through the dioxin-like substances being passed to them by their mothers.

Therefore, the use of empirical dispersion models from industrial plants, presented as an assurance of lack of health risk, cannot suffice with bioaccumulative persistent toxic substances. Essential additional information is required, over and above what is used in the assessment of transient pollutants, namely a knowledge of the degree of intoxication of the target population before adding a new source. As stated above, in toxicology the only absolute determinant that will dictate whether a toxic effect occurs is the body tissue level. To date, there is not a single example of such a study having been performed prior to the building of any industrial plant. This inadequate approach, however, is still being employed!

Another confounding factor in the assessment of the effects of some groups of bioaccumulative substances is that their toxic effects can be subtle and furthermore have their maximal effect on the next generation while in the womb. The results of such exposure may not become apparent until adulthood and therefore there may be a very long time lag between exposure and effect, making it extremely difficult to link it to the cause.

The classical approach to risk assessment when predicting damage from pollutants is to consider each chemical in isolation, perform animal experiments and try to decide if there is a zero effect level and therefore an environmental loading that

can be considered safe.

With a number of organic pollutants which cause effects such as immunosuppression and hormone disruption, research is showing that mixtures can have an additive or synergistic effect. It appears that the foetus is most at risk to the effects of

these types of pollutant. Under these circumstances classical risk assessment ceases to be of use and it becomes difficult or impossible to predict effects. Society does not really possess the intellectual, regulatory or legal instruments to approach such problems currently. However the mantra of "There is no evidence" - to justify the continuation of the current bulk global production of persistent bioaccumulative toxic substances - simply will not do. "There is no evidence" can and does often mean "We didn't look" or "We didn't measure the right things." It also takes advantage of the knowledge that there is no definitive answer available with respect to human and ecological health with respect to the mixture problem. That, in my view, is not an excuse for doing nothing. Future generations will not thank us for failing to take a precautionary approach during our temporary stewardship of the environment which they will have to inherit.

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Scientific Superstitions: The Cult of Randomness and the Taboo on Teleology

by Edward Goldsmith

Critical to maintaining the credibility of modern science is a whole series of dogmas that are believed in quasi-religiously by our scientists contrary to all the empirical and theoretical evidence. In this article the author considers two of them: the randomness of life processes (in particular the all-inclusive life process: evolution), and hence the denial that they are purposive or teleological.

he notion that the ecosphere and everything in it is the product of pure chance is critical to the paradigm of reductionist science.

The French biologist and Nobel Laureate, Jacques Monod,1 refers to the mechanism determining the evolution of life and of culture as a "gigantic lottery" or as "Nature's roulette". "Chance alone", he sees,

"as the source of every innovation, of all creation in the biosphere. Pure chance, absolutely free but blind, is at the very root of the stupendous edifice of evolution.

This central concept of modern biology is no longer one among other conceivable hypotheses. It is the sole conceivable hypothesis, the only one that squares with observed and tested fact. And nothing warrants the supposition - or the hope - that on this score our position is likely ever to be revised."

Many neo-Darwinists, however, (including Dobjzansky and Julian Huxley, grandson of T. H. Huxley, Darwin's famous disciple) have adopted a less extreme position. They admit that mutations may well be caused by factors that we ignore, but nevertheless in all cases, as Huxley insists,2

"they are random in relation to evolution. Their effects are not related to the needs of the organism, or to the condition in which it is placed. They occur without reference to their biological uses."

What in effect Huxley is saying is that, although something makes a mother feed her child, whatever that something is, it is unconnected with the child's need to be fed by its mother.

Even this is unacceptable. Life processes, in the real world, are not random, even in this less extreme sense of the term. Art styles for instance are not developed at random, but closely reflect the character of the cultures in which they are developed. The clothes people wear are indicative of the image of themselves they wish to communicate to others. The way people walk, eat, light a cigarette, blow their nose, do up their shoelaces - all convey some information as to the personality of the individuals concerned.

Behaviour is, in fact, so much more ordered than people think, and consequently so little random, that it is questionable whether people are in fact capable - even if they so desire - of behaving in a random way. This appears to be confirmed by various experiments such as those described by the psychologists W. R. Ramsay and Anne Broadhurst³ who experimented with a panel of 72 people by asking them to repeat in time to a metronome a series of numbers, 1 to 9, in as random a manner as possible. Significantly they found that:

"... in accordance with other studies on randomness

and response in human subjects, the result of this experiment shows that even when subjects try to be random, there is a high degree of stereotype."

It has been suggested that it is possible even to identify a particular individual by his "random number matrix" and also that a pathological configuration of a matrix might reveal a mental disease. A set of random numbers has actually been used to enable a practitioner to differentiate between brain-damaged patients and normal subjects. The British cybernetician, Stafford Beer4 also rejects the view that randomness is a natural feature of behaviour in the natural world. He writes,

"There are a random number of tables on my book-shelf; there are computer tapes for producing pseudorandom numbers next door; there is a large electronic machine for generating noise upstairs; down the road there is a roomful of equipment designed to

hurl thousands of little metal balls about in a random way; and I use ten-sided dice as paper-weights. The upkeep of this armoury is considerable; think of all the time we spend trying to ensure that these artefacts produce results which are 'genuinely random' - whatever that may mean. This tremendous practical problem of guaranteeing disorderliness ought to be enough to satisfy any systems-man that nothing is more unnatural than chaos."

This is a hideously heretical view in the eyes of contemporary scientists, but one that is consistent with the thinking of C. H. Waddington, the British geneticist, embryologist and



Jacques Monod, French biologist, (1910-1976), Nobel Laureate.

theoretical biologist, Ludwig Von Bertalanffy, the founder of 'General Systems Theory', Jean Piaget, the Swiss biologist and psychologist, and others who have rejected (implicitly or explicitly) some of the more glaring absurdities of the paradigm of modern reductionist science and its derivative the paradigm of neo-Darwinism.

The notion that the world is orderly, and that life processes are purposive was fundamental to the world-view of traditional societies throughout the world. This basic principle was used by the natural theologians of the seventeenth and eighteenth centuries as a means of proving the existence of God. However, 19th-century science was in search of what was called a "naturalistic" explanation: that is, an explanation formulated in the language of physics, to the exclusion of anything regarded as "vitalistic" or "supernatural". Teleology therefore had to be avoided at all costs, and it was one of the chief attractions of Darwinism that it appeared to satisfy this condition.

But how do scientists know that a process is random? How do they know it is not part of an orderly pattern that they

simply have not been able to identify? The great French naturalist, J. P. Lamarck, who is considered to be the founder of modern biology, is often quoted as stating that "the word randomness only expresses our ignorance of causes." The French physicist, Henri Poincaré, also saw randomness as but a measure of our ignorance, as did the French theoretical biologist, Albert Jacquard, and also C. H. Waddington, in particular with regard to the randomness of genetic mutations.

The truth of the matter is that scientists know very little about the incredibly complex and beautiful world we have inherited. As Wendell Berry⁵ writes:

"We are up against mystery" and "to call this mystery 'randomness' or 'chance' or a 'fluke' is to take charge of it on behalf of those who do not respect

pattern. To call the unknown 'random' is to plant the flag by which to colonize and exploit the known. To call the unknown by its right name, 'mystery', is to suggest that we had better respect the possibility of a larger, unseen pattern that can be damaged or destroyed and, with it, the smaller patterns."

Recent studies have tended to confirm this view. Biologist John Cairns and his colleagues at Harvard University have conducted studies that suggest that mutations are not random; but are, on the contrary, highly adaptive. Cairns's studies were, at first, dismissed by the scientific establishment; however, Barry Hall, of Rochester University, has now come up with similar results. He has found that certain mutations in bacteria, occur more often when they are useful to the bacteria, than when they are not. Cairns refers to such mutations as "directed mutations" while Hall refers to them as "Cairnsian mutations" – in honour of their original discoverer.

There is every reason to doubt too the concept of 'genetic drift' which has been postulated to explain evolutionary changes that do not appear to have been 'selected'. More and more people are coming to regard this concept – which is far less in use today than it was twenty years ago – as but a convenient device for masking our ignorance of the role of such changes.

The U.S. Geological Survey has until recently also insisted

Jean Baptiste de Monet de Lamarck (1744-1829). An important thinker in evolutionary theory and almost universally despised by neo-Darwinists.

that earthquakes occur randomly. However, according to Ruth Flanagan,⁶ the U.S. Geological Survey is having second thoughts. Ruth Flanagan notes all sorts of factors that are increasingly associated with the occurrence of earthquakes.

Chemical secretions by bacteria, as Elizabeth Pennisi notes, have been dismissed as "uninteresting by-products of metabolism" in other words waste or, she might have said, randomness. It is increasingly realized that these chemicals are secreted as part of an elaborate communication system between microbes that enable them, among other things, to form microbial societies. If our scientists have not realized this before, it is that bacterial communication has never up till now been properly studied. It has required the development of more sophisticated methods for growing and studying bacteria for it to be possible.

It was also thought for a long time that the genome was a random arrangement ("bean-bag") of chromosomes and genes. It is

> now generally realized that it is on the contrary highly organized. Complexity is also amazingly enough still seen by modern ecologists as random complexity, a complex ecosystem being made up of a large number of living things without any consideration for whether they contribute to, or, on the contrary, impair the integrity or stability of the ecosystem as a whole. Thus the introduction of alien pests, like the rabbit into Australia, and the Dutch Elm bark beetle into Europe, are naively seen as increasing the complexity of Australian and European ecosystems respectively.

> Indeed, more and more processes which originally appeared or still appear to be random, are found, or, I am sure, soon will be found, upon closer examination, to be highly functional and indeed purposive. In the case of evolution, one does not need experimental "evidence" for rejecting the idea that it is based on random mutations. We know today that single gene mutations can only determine extremely superficial changes.

Significant changes can only be brought about by changes occurring to a whole constellation of associated genes (polygeny). This means that for a

"functional unit to make an adapted change," as Rupert Riedl⁷ notes, "requires not just one happy accident, but *an accumulation of happy accidents.*" Does this seem likely?

Waddington⁸ did not believe it in spite of his insistence on remaining within the neo-Darwinian fold. He admitted, in the talk he gave at Arthur Koestler's famous Ansbach Symposium, that to suggest that evolution was based on selection from random mutations was

"like suggesting that if we went on throwing bricks together into heaps, we should eventually be able to choose ourselves the most desirable house."

Murray Eden rejects the thesis on the grounds of its sheer mathematical improbability. "It is as unlikely as it is that a child arranging at random a printer's supply of letters would compose the first 20 lines of Virgil's Aeneid."

The philosopher of Science W. M. Elsasser⁹ feels the same way. There has simply not been enough time available since life first appeared on our planet for this crude process to have given rise to the world of living things as we know it today. It has been said that, with sufficient time at their disposal, a batch of monkeys, strumming on typewriters, could eventually compose and type out all of Shakespeare's sonnets. But as Elsasser points out, the syllables in just the first lines of these sonnets can be combined in 10¹⁴³ ways, while the total number of seconds that have elapsed during the existence of our galaxy is at the most 10¹⁸. Lecomte du Noüy notes that a sphere of matter, in which even the simplest protein molecule (made up of only 2,000 atoms of only two different kinds) can be formed by the fortuitous coming together of the constituents, would have to have a radius of 10⁸² light years which far exceeds that of the universe.

Even Francis Crick, who earned the Nobel Prize together with James Watson for having worked out the genetic code, realizes that the 3,000 million years since life began on our planet are far too short a period for the living world to have evolved by the process of selection from random mutations. He suggests the evolutionary process was initiated on some distant planet whose enlightened inhabitants generously dispatched to us various ancestral bacteria in a rocket. After that it was plain sailing – just a matter of time for selection to do its job and for more and more complex forms of life to evolve. It clearly does not say much for Darwin's theory if, to make it work, we have first to postulate a science-fiction scenario of this sort.

A less biased student of evolution, one might argue, would surely consider the possibility that the mechanism proposed by Darwin *was simply wrong* – that there is no way in which selection from random mutations could conceivably be the prime

mechanism of evolutionary change. Why then do Crick and the other leading scientists of today continue to insist on the absurd notion of the randomness of life processes? Why indeed has it actually been raised to the elated status of "the central concept of modern biology". I shall suggest some possible answers.

To begin with, randomness

was postulated as an argument against teleology, which was seen as ushering in all sorts of unacceptable supernatural principles, such as God, or various forms of vitalism. Also the ideas of order and teleology were associated with the status quo, i.e. with the interests of the landed classes, rather than with those of the growing industrial classes.

The postulate of randomness was also essential in order to rationalize the reductionist nature of modern science. If the eco sphere displays order – worse still, if the whole evolutionary process were seen as a single co-ordinated strategy, involving all life processes at all levels of organization – then the reductionist approach of modern science would make no sense whatsoever.

The postulate of randomness is also required to justify the fashionable highly obscurantist statistical method, which is in turn required to rationalize other key features of the Paradigm of Reductionist Science, reductionism itself for instance, and the reductionist principle of causation.

Also, it is impossible to justify the Promethean enterprise to which our industrial society is committed, and which involves systematically transforming the ecosphere so that it may best satisfy short-term commercial interests, if it is seen to be organized to achieve a grand overall project of its own. By seeing the ecosphere as random, on the other hand, it is possible to make out that what order there is in the world in which we live has been created by science, technology and industry, rather than by God or the evolutionary process.

As J. D. Bernal writes¹⁰:

"The cardinal tendency of progress is the replacement

of an indifferent chance environment by a deliberately created one."

The insistence by mainstream scientists to maintain the principle of the randomness of life processes in the face of all the evidence, both empirical and theoretical, to the contrary, provides an excellent illustration of Thomas Kuhn's thesis (one that is now accepted by just about all our serious philosophers of science) that scientific propositions are not accepted because they can be verified or falsified empirically, as reductionist scientists still seem to insist, but because they are consistent with the paradigm of reductionist science and the world-view of modernism which it so faithfully reflects, and which, by the same token serves to rationalize and hence legitimize them.

Why does Crick not accept, along with that most eminent of French zoologists P. P. Grassé, that

"the idea that living things have been brought into being by purely random forces is a gratuitous statement, one which we must regard as wrong and as irreconcilable with the facts."?

Life Processes are Purposive

The evidence for the goal-directedness or purposefulness of life processes at every level of organization within the hierarchy of the ecosphere is so great that its denial to normal people seems quite inconceivable.

What in effect Huxley is saying is that although something makes a mother feed her child, whatever that something is, it is unconnected with the child's need to be fed by its mother. Thus it seems absurd to deny that the evolution of gills and fins by fish is purposeful to breathing and moving about in their aquatic environment, or that the development of mammary glands by the females of all species of mammal is purposeful to feeding their babies, or that the human milk provided in this way is

designed to satisfy the nutritional needs of their young in the first one or two years of their lives.

To Sir Charles Sherrington,¹¹ it seemed obvious that the *embryological process*, whereby "a pin's head ball of cells in the course of so many weeks becomes a child," is purposive. Joseph Barcroft¹² points to "the levers laid down in gristle, becoming bone when wanted for the heavier pull of muscle which will clothe them. Lungs, solid glands, yet arranged to hollow out at a few minutes' notice when the necessary air shall enter. Limb-buds, futile at their appearing and yet deliberately appearing, in order to become limbs in readiness for existence where they will be all-important." Barcroft¹³ is particularly impressed by the development of embryonic organs, useless at the time to their possessor, but which will be indispensable later on during the course of its development.

"Organs of skin, ear, eye, nose, tongue," he writes,

"superfluous all of them in the watery dark where formed, yet each unhaltingly preparing to enter a daylit, airy, object-full manifold world which they will be wanted to report on."

Purposiveness is also evident in *physiology*. As Gavin de Beer¹⁴ notes:

"The structure of an animal shows a number of exquisitely delicate adjustments; the splinters inside a bone are situated exactly where they are required to withstand the pressure to which the bone is subjected; the fibres of a tendon lie accurately along the line of strain between a muscle and the bone to which it is attached; centres of nerve cells in the brain are situated close to the ends of the nerve fibres, from which they habitually receive impulses."

Purposiveness is equally apparent in *animal behaviour*. As Bierens de Haan¹⁵ writes:

"the weaving of the web by the spider is purposeful for the catching of insects, and the collecting and storing of caterpillars by the wasp purposeful for the nourishing of its future larva, are facts that are so self-evident that it is not necessary further to elucidate them."

If life processes achieve their purpose it is because they are under control, but they could not be controlled in the first place unless they had a purpose to achieve. Control serves to assure that life processes achieve their pre-existing purpose. This is clear if we consider that a basic ingredient of control is 'negative feedback', which is totally useless to a non-purposive system.

An essential constituent of an animal's control mechanism is perception, and perception is essentially purposive. As Keith Oatley¹⁶ writes, "the way we see is in terms of our human purpose in the environment." Or again, what we see "depends on our particular purpose at the time, what we are trying to do, what aspect of the thing we are seeing that is relevant to what we are trying to achieve." What is more, it is not just in terms of a short-term purpose that we see things but ultimately in terms of a long-term strategic purpose, for shortterm tactical purposes are meaningless except when seen in the context of the long-term strategy of which they are part, while at the same time, our individual strategic purpose is meaningless outside the overall purpose of our society, our ecosystem and the ecosphere as a whole.

The truth of the matter is that purposiveness (conscious or unconscious) is an essential feature of all life processes, at all levels of the ecosphere. Things cannot be organized for random reasons. As Pittendrigh¹⁷ notes,

"order, or organization without purpose, is an absurdity ... there is no such thing as organization in any absolute sense pure and simple. Organization is always relative, and relative to an end. (Thus) the organization of an army is relative to the end of defeating an enemy; and doing so, moreover, in a particular environment or terrain, weapons and political system. A room may be organized with respect to relaxation. Certainly, neither a room nor any army can be organized with *respect to nothing*."

Thus, if one states that living systems are organized, then one must be ready to face the question "With respect to what are they organized?" As von Bertalanffy¹⁸ notes, "The notion of 'organ', of visual, auditory, or sexual organ, already involves the notion that this is a 'tool' for something." Animals will eat and drink and breathe and reproduce because these processes are as much part of them as are the organs that assure these functions. Indeed, there are no such things as animals that do not eat and drink, breathe and reproduce, except as photographs, pictures, concepts and words, nor are there such processes as eating, drinking, breathing and reproducing taken apart from the organisms involved. This must follow from the fact that living things are spatio-temporal systems, which means that the order they display is spatio-temporal order and this necessarily implies purposiveness.

As Herbert Mueller puts it,

"purpose is not imported into nature, and need not be puzzled over as a strange or divine something else that gets inside and makes life go ... it is simply implicit in the fact of biological organization."

Real ecology has to be teleological

The teleological explanation of life processes is an expla-



James Lovelock, father of Gaia Theory.

nation in terms of its ability to achieve its goal or purpose – Aristotle's "final cause" rather than its antecedent cause which alone is accepted by the scientific community. Teleology, the Swedish Nobel-winning neurophysiologist, Ragnar Granit,¹⁹ tells us, is required to answer the question of *why* things happen without knowing which, it is very difficult to answer the question of *how* things happen.

Granit²⁰ points this out with reference to the discovery of how the eye adapts to light and darkness.

"When rods and cones were discovered in the vertebrate retina," he writes, "had it not become evident that rods dominated in retinas of the night animals and cones in those of daylight animals, this discovery would have remained an observation of but limited consequence. Instead, understanding of its meaning (why) made it a cornerstone in a large body of biological research dealing with the adaptation of the eye to light and darkness, rod vision and cone vision, and the rod-free central fovea of the human retina."

The truth is that rods and cones, however brilliantly they are described, only acquire meaning once one knows what they are for.

In other words, it is only once one has established what is the goal of any organism or natural system that one is in a position to seek out how it sets out to achieve this goal.

This is exactly *how* James Lovelock²¹ developed his famous Gaia thesis.

"To examine the earth cybernetically", he writes, "is to ask the question 'What is the function of each gas in the air or of each component of the sea?' Outside the context of Gaia, such a question would be taken as circular and illogical, but from within it is no more illogical than asking: 'What is the function of the haemoglobin or of the insulin in the blood?' We have postulated a cybernetic system; therefore, it is reasonable to question the function of the component parts."

Thus, Lovelock starts off by pointing to the extraordinary constancy of the chemical composition of the ecosphere (or Gaia) – that of the oxygen and carbon dioxide content of the atmosphere, for instance, and of the salt content of the sea. *He then searches for mechanisms that could assure this constancy*. Ralph Gerard,²² the Chicago University holistic biologist notes how the physiologist proceeds in precisely the same way.

"The physiologist's whole life", he writes, "is concerned with problems of organic purpose, though he rarely likes to say it, particularly in public. We see purposeful behaviour all through the body; it is the only way it makes sense to us. And then we look for the mechanisms to account for it."

In terms of the Paradigm of Reductionist Science, this method of building up knowledge is totally illegitimate. To accuse a scientist of using a teleological argument is to accuse him of being unscientific, indeed, of being a veritable charlatan. Very few scientists would be willing to take that risk. Even James Lovelock does not admit that his argument is teleological. The Daisy World model, which he developed with Andrew Watson, of the Marine Biological Association at Plymouth, to which he attaches so much importance, is primarily designed to show that a cybernetic process need not be teleological. However, it is but a rudimentary and indeed hypothetical cybernetic process and it would prove very much more difficult to build a realistic model serving to demonstrate that the very much more sophisticated multi-stage cybernetic behaviour of

complex forms of life in the real world, such as the embryological process for instance, is non-teleological.

Nevertheless, Lovelock realizes the absurdity of the scientific taboo on teleological method:

"Teleological explanations in academe", he writes, "are a sin against the holy spirit of scientifi

the holy spirit of scientific rationality; they deny the objectivity of nature."

The Nobel Laureate, Sir Peter Medawar, felt the same way: "The attitude of biologists to teleology is like that of

the pious towards a source of temptation which they are unsure of their ability to resist."

So did Van Bruck (the elder)²³. Teleology for him was "like the kind of woman people do not want to be seen with in the street, yet are prepared to tender their love to in secret."

Scientists will go to the most extraordinary lengths to make it appear that the statements they make are non-teleological. One ruse is to deny the purposiveness of life processes altogether and to argue that nature only *appears* purposeful. Julian Huxley²⁴ tells us that "at first sight the biological sector seems full of purpose. Organisms are built *as if* in purposeful pursuit

of a conscious aim. But the truth lies in those two words 'as if'. As the genius Darwin showed, the purpose is only an apparent one." He adds that

"No conscious seizing of opportunities is here meant, (by the use of the word purpose) nor even an

unconscious sensing of an outcome. The word is only a convenient label for these tendencies in evolution; that what can happen usually does happen; changes occur as they may and not as would be hypothetically best; and the course of evolution follows opportunity rather than plan."

Of course the opposite is true. "Opportunism" is itself a teleological concept. An adaptive individual does not seize any opportunity to bring about a *random* change, but clearly the one that best suits its purposes – the one that it judges to be "hypothetically best" – for itself and for the hierarchy of natural systems of which it is part.

More devious expedients are resorted to by scientists in order to mask the teleological nature of their arguments. One device – a purely linguistic one – is to formulate an obviously teleological statement in such a way that it no longer appears teleological. Merrill²⁵ notes how throughout modern biological literature, we find

"a great array of teleological jargon bearing witness, as it were, to the homeorhetic tendency of living systems (the tendency of a living system to keep to that path that will enable them to achieve stability or homeostasis). Biologists are always talking of one thing occurring, 'for the purpose of something' or, 'in order that something might happen' or, 'serving the function of something' and so on."

However, philosophers still go to great lengths to show that these statements can be translated into a non-teleological form. This often leads them "into a morass of circumlocutions".

Thus, biologists, as Granit²⁶ notes, have been "prepared to say a turtle came ashore and laid its eggs," but not that "It came ashore to lay its eggs."

The way people walk, eat, light a cigarette, blow their nose, do up their shoelaces all convey some information as to the personality of the individuals concerned. logists will studiously avoid making the teleological statement that "the function of the vertebrate heart is to pump blood". Instead it is translated into non-teleological language simply by saying that "the heart is a necessary condition for the circulation

The cybernetician, Peter

Calow²⁷ also shows how bio-

of blood in vertebrates."

However, whether mainstream scientists like it or not, the heart is an organ and, like all organs, it has a function or a purpose,²⁸ in this case to pump blood, nor did it come into being by accident (i.e. for random reasons) but in order to do just that.

Possibly the latest device used to avoid facing the essential teleological nature of life processes is to attribute their directiveness to the action of environmental "attractors". This notion is used, for instance, by my friend Brian Goodwin in his extremely interesting book, *How the Leopard Changed its Spots.* He suggests the idea "that natural processes follow paths that decrease energy or some similar function, suggesting that what comes naturally is a path of least effort or action."²⁹ He sees this as an alternative to the neo-Darwinian view, which he has always opposed, that biological and physical change occurs

To accuse a scientist of using a teleological argument is to accuse him of being unscientific, indeed, of being a veritable charlatan. as a result of struggle and effort. This makes considerable sense to me, however. I see natural systems as very dynamic and creative and perfectly capable of creating those specific conditions in which energy use will be reduced to a minimum. That is exactly what happens when

a pioneer ecosystem develops into a climax ecosystem – one in which stability is maximized so that the further use of energy and resources is limited to the minimum – that required for maintenance and repair. This obviously purposeful behaviour can only seriously be seen as part of the dynamic of the ecosystem itself. In attributing it to the action of environmental attractors Goodwin lays himself open to some of the major objections made in this article to the idea that it is determined by natural selection. (See page 201 in particular.)

Another device resorted to by mainstream scientists is to provide a purely mechanistic explanation of purpose. The inspiration came from the machine with feedback of the sort with which cyberneticians are largely concerned. These machines are programmed in such a way that they seek to achieve a goal. However, such goal-seeking behaviour is not deemed teleological, in the sense that it is not seen as tending towards a 'final cause', hence it does not require some sort of supernatural explanation. The principle involved is reconcilable with that of causality, reductionism, statistical method and of course, mechanomorphism. Indeed, as Henri Atlan³⁰ puts it,

"this new type of goal directedness is acceptable in

that it is not derived from theological idealism, but from neo-mechanism." -

i.e. from a scientifically *acceptable* metaphysics rather than from a scientifically *unacceptable* metaphysics. Such purposefulness is referred to as 'teleonomy', a term first used by the biologist Colin Pittendrigh, and later taken up by Julian Huxley, the theoretical biologist Ernst Mayr, the French molecular biologist and Nobel Laureate, Jacques Monod, C. H. Waddington, and other leading biologists, and has thereby become quite respectable.

The acceptance of teleonomy does enable us to ask the question "why" rather than "how" but only within a limited sphere, that of the functioning of a machine. It may indeed tell us what is the immediate goal of a natural process, but it tells us nothing of the ultimate goal to which its achievement contributes. It even implies that there is no such ultimate goal.

The development of molecular biology culminating in the decoding of the genetic code by Crick and his colleague Watson has further increased the credibility of the notion of teleonomy. Living things, molecular biologists maintain, give the impression of tending towards a goal or final cause, but this is only because they have been programmed like machines to move in this direction. Instead of a computer program, as it has been said, the *Deus-ex-machina* is now the genetic programme.

However, no life process can be understood merely in terms of the information with which it has been programmed, for it is under the control of the larger systems of which it is part and that provide it with the environment with which it is constantly interacting and from which it derives much of the information required for its development. Thus a developing embryo acquires information during the entire embryological process; first from the cytoplasm, then from the womb and later, when the child is born, from its family, and as it grows up, from the community and ecosystem of which it is part.

As already mentioned, one of the main attractions of neo-Darwinism is that it appears to be non-teleological. That this is an illusion is clear from the fact that just about all the basic concepts of neo-Darwinism are highly teleological. Take competition; it implies competition for something. One cannot compete for nothing. Since competition, for Darwinists, is intimately linked with the notion of the 'survival of the fittest' it means competition to survive. But why should living things want to survive? We assume that they do, but this is a gratuitous assumption. Stones do not want to survive particularly. At least they make no visible effort to do so. Lamp bulbs, nylon stockings and many other consumer products are designed specifically not to survive, since it is 'economic' to build into them 'planned obsolescence'.

The concept of natural selection, another key concept of neo-Darwinism is equally teleological, a point made over and over again by the eminent French zoologist P. P. Grassé.³¹ "There cannot be selection without purpose (intention)," he writes, and,

"by explaining the evolution of the fittest in terms of selection, they (the neo-Darwinists) are endowing all living things with an inherent goal, and goal-directedness becomes the supreme law of the individual, with the population and with the species."

In reality, the concept of natural selection is of use to neo-Darwinists largely because it provides a means of delegating surreptitiously, and it is hoped imperceptibly, to a vague and undefined environment, the teleological functions that natural systems alone are capable of fulfilling adaptively. In this way the latters' own behaviour can be made out to be random. It is, of course, a desperately feeble subterfuge, especially as their environment is itself made up of other natural systems, the purposiveness of whose behaviour no one seems to question.

Ecology has to be teleological, for purposiveness is possibly the most essential feature of the behaviour of natural systems, including ecosystems. It is only in terms of a teleological ecology that we can understand the role of natural systems within the whole Gaian hierarchy, in particular their fundamentally 'homeotelic' or whole-maintaining character,³² which above all makes possible the essential order, integrity and stability of the living world.

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The photograph of Dr Eugene Odum on page 148 of *The Ecologist* July/August 1997 should have been credited as follows: Rick O'Quinn/UGA Photographic Services. We apologize for this omission.



Notes, Quotes and Spoofs

Childhood as Disease

In February 1979 the Food and Drug Administration of the United States of America ordered the elimination of a diagnostic term as being unscientific.

The disease was called Minimal Brain Dysfunction (MBD) and its manifestations were so described as to embrace a condition called childhood. Every American child could fit the diagnosis and the treatment for this disease is Ritalin.

The psychiatrists of America in collusion with Ciba, who hold the patent rights for Ritalin, had invented a disease in order to sell a product. Their product is a drug of addiction and the disease called Minimal Brain Dysfunction can be diagnosed as early as the age of two years.

> The disease was called Minimal Brain Dysfunction (MBD) and its manifestations were so described as to embrace a condition called childhood.

With American youth hooked on Ritalin, the sales of Ritalin for Ciba would be assured for ever.

Ciba themselves admit that the withdrawal symptoms from Ritalin include insanity, suicide, attempted homicide and homicide.

As a result of the intervention by the FDA, the name of the disease has been changed but "new facts" have been added to the description of the disease. It is now called Attention Deficit Disorder, and the concept plus Ritalin has been exported to Britain. A psychiatrist called Dr Christopher Green is touring Britain giving public lectures in which he explains to the authorities that this disease is caused by a gene which damages the brain.

Families who produce these children are genetically defective and are the source of tomorrow's criminals, according to the psychiatrist.

And thus we are reminded that modern science has acquired the fixed idea that human behaviour is determined by the chemistry of the brain and that all



mental illness is due to a deficiency of some drug or other which if not yet discovered will be, if enough money is spent on research.

Any protest to such a mechanistic and materialistic belief in Man's true nature is met by the scientist's Nobel Prize-winning DNA expert called Francis Crick, who has now discovered the soul.

Since the days of Professor Wundt, the originator of American Psychiatry, Academe has accepted that psychology must be the study of the psyche in the absence of a psyche.

> Ciba themselves admit that the withdrawal symptoms from Ritalin include insanity, suicide, attempted homicide and homicide.

But now the psyche has been rediscovered and according to Crick it is an electric circuit in the frontal lobe of the brain.

Professor Crick now has the potential ability to lift the lid off his skull and with a couple of mirrors take a peek into his head and see his own soul.

Can you not see how insane and dangerous has become the practice of preserving ignorance by inventing knowledge?

Dr Edward Hamlyn



Reviews

The Family Besieged

Christopher Lasch on Technology and the Family

The traditional family is in trouble throughout the West, and if trends continue, elsewhere too. Christopher Lasch, who died in 1994, offered in his various writings striking insights into the dynamics of the family and its decline. His work of 1977 Haven in a Heartless World looked in depth at the causes of the decline.⁴ In later works, Lasch added to that analysis: The Culture of Narcissism (1987), The Minimal Self (1984), The True and Only Heaven (1991) and The Revolt of the Elite (1995). In his works, he continually and successfully contradicts the fashionable modern assumption that the family is by its structure tyrannical and points out that the health of any society must depend upon the health of its communities which in turn must depend upon the health of their families.



Lasch points to consumerism as a major factor in this decline. Many voices of course now deplore overconsumption. In a speech to the nation in July 1979, President Jimmy Carter said

it was Americans' obsession with 'things' that lay behind their malaise. But such pleas turn consumerism into merely a moral failing. At the same time, they often attack it merely to "make America great again" through more production and dedication to work. Both the consumer and the producer societies, Lasch argues, undercut self-help, independence and initiative. Like the TV zombie, even the worker becomes passive, a spectator rather than a craftsman, a machine minder or paper pusher rather than a creative worker.3

We should not misunderstand consumerism merely as hedonism. It creates not only greed and pleasure-seeking but, more importantly, dissatisfaction and anxiety. Market researchers and industrial psychologists find ways to make consumers 'need' ever more things, while pollsters and the media show them what they will have to buy to keep up

"They eat junk food, listen to junk music, read junk comics, and spend endless hours playing video games ..."

> with the Joneses. The auto gives a good example: Henry Ford mass-produced autos, but Alfred Sloan of General Motors added new models every year, a whole range of colours, and appealed to power and status. "Modern industry", as Lasch puts it, "came to rest on the twin pillars of Fordism and Sloanism. Both tended to discourage enterprise and independent thinking and to make the individual distrust his own judgement, even in matters of taste."⁴

Advertisements glorify this uncer-



Phil Mat

tainty as "freedom of choice", and the majority of academics share that view. As one leading sociologist put it, women no longer need be chained to the drudgery of housework and the demands of children. Enjoying many career options besides the family, they are freed from parents looking over their shoulders and neighbours dictating their tastes.

But choice, when all options lie open, becomes merely a matter of style. Such bland pluralism assumes that all 'lifestyles' are equally valid. It promises you can choose anything, and that the various choices will make no difference to soci-

ety. So the pluralists end in confusion: "They make choice the test of moral and political freedom and then reduce it to nonsense."⁵

Note how this position affects marriage and the family. Because the self is Proteus-like, always changing, we need "open marriages" with no lasting ties or intolerable demands. A book called *Open Marriage* commends "non-binding commitments", not noticing the contradiction.⁶

"You can be anything you want," we

hear. You have to "keep your options open." You can change your identity, lovers, careers: life is an open-ended experiment, and you can always take your life "back to the drawing-board" after it crashes. As the sociologist Willard Waller put it in 1930, the "rating and dating" system among college youth fostered a bohemian attitude: life becomes a trade-off of sensations and status, and falling in love becomes a faux pas.⁷

What does such freedom cost children? TV, says Lasch, becomes their

babysitter. They are sent to the crèche or childcare centre, where they get only superficial attention. "They eat junk food, listen to junk music, read junk comics, and spend endless hours playing video games ... They attend third-rate schools and get third-rate moral advice from their elders." Neither teach-

ers nor parents feel they should "impose" their standards on their children. Warning against authoritarian behaviour, Dr Benjamin Spock, in his hugely successful book of 1946, *Baby and Child Care*, urged parents to let children do just what other children do. The peer group alone now sets the standards of conduct. But where do children and adolescents get their own ideas and self-images? From the media that surround them, from the advertisements of a consumer culture that bombard them day and night. Small wonder they turn

into super consumers, the gimme kids whose inner emptiness leads to still more hope for salvation and meaning in goods.

Permissive educators say children must never be restrained or punished; they must enjoy full creativity and "free expression". But the outcome is a youth culture without internalized standards or inhibitions, that ends in a war of all against

all. At the famous school of Summerhill, according to an observer, children were free to bully both their teachers and one another: "The 'survival of the fittest' appeared to be the norm."⁹

The family is in crisis, not because of moral flaws alone, lack of good will, or merely the rise of hedonism, but more fundamentally as a consequence of the growth of industry and the state, that usurp the family's functions and make it largely superfluous. The family no longer functions to protect, to instruct, or to do productive work. Work has moved entirely outside the home, to office or factory; protection has passed to the police, and education to the schools. "When protection, work, and instruction in work have all been removed from the home, the child no longer identifies with his parents or internalizes their authority in the same way as before, if indeed he internalizes their authority at all."

The father becomes at best a provider, with possibly a touch of disci-

Like the TV zombie, even the worker becomes passive, a spectator rather than a craftsman, a machine tender or paper pusher rather than a creative worker.

> plinarian. The family does not even provide emotional security; following the business principle that anyone may leave a job when a better one comes along, the parents can split it at will. Nor do the parents offer moral instruction. Leading authorities like Talcott Parsons say parents should not inculcate their children with moral standards, because standards are changing too rapidly. "Parents", said Parsons, are not "abdicating" responsibility; they are simply being realistic. The only function left to the family, in Parsons's view, is the

The family is in crisis, not because of moral flaws alone, lack of good will, or merely the rise of hedonism, but more fundamentally as a consequence of the growth of industry and the state, that usurp the family's functions and make it largely superfluous.

> "production of personality," where personality is understood as "mastery of personal relationships". But this abandoning of principles of duty and conduct, Lasch responds, conceals a deep despair: its defenders have given up hope of controlling technology and the world of commodities.¹⁰

> Worse, the family has given up even its socializing functions to psychotherapeutic "experts". In the superindustrial age, say leading futurists, the family will be stripped down to marriage, or

husband-and-wife interaction. Some suggest communes or extended families, to take over where helpless parents cannot cope. Margaret Mead and others have argued that the function of parenting should be handed over to professionals, to couples who have received expert training for the job. As Lasch pointedly comments, "The rest of the population, freed from the burdens of child-rearing, will find spiritual enrichment in the intensive exploration of one-to-one relationships."¹¹

The "helping professions" took the

next step in undermining the family and parental authority. Parents were told they needed expert advice to raise their children. This cult of expertise appeared in Dr Spock's book. Though Spock told parents to "trust your instincts," he at the same time urged them to call in psychiatrists and physicians to treat prob-

lems that in the past would have gone almost unnoticed. A sea of such literature undermined any residual confidence of parents in their own abilities, while placing enormous burdens on them: even thoughtless words, said Spock, can "destroy the child's confidence" for many years.¹² Meanwhile parents were losing experience of bringing up children, housekeeping, or nursing the sick: during their own youth, these functions had been handed over to others. In addition, the experts so often differed with one another that parents' confidence was

> further undermined, and their uncertainty intensified their quest for expert advice.

Who then set such standards as remained? Those not set by the experts were left to the children themselves. The permissive educators counselled parents to leave the children's moral education to the peer group. Because norms are constantly changing, the child can in fact claim superior knowledge; he

or she knows the norms of the peer group best and judges the parents' wishes by them. Along with the health and welfare experts, the peer group undermines parents' confidence. When parents attempt to "reason" with the child, they come up against the arbitrary authority of the youth culture. Under the guise of "universalistic" standards replacing parental ones, a rule of custom has come in; the customs and axioms of a therapeutic culture.¹³

So who does give the peer group its

standards? Consumer society, dominated by the advertisers and the mass media. While in the fifties the media promoted the cult of 'togetherness', today they promote apartness and individualism; their targets are so busy "getting in touch with their feelings" they feel no concern about the demise of

the family, the community or traditional values. Neither the media nor individualists want external or hierarchical authority. But with the end of authority in family and society, morals decay. Crime thrives even within corporations, and the rip-off becomes standard practice, along with corruption of offi-

cials. In the end, the weakness of community and religion gives rise to the authoritarian state.

At the root of the problem lies the growth of factories and corporations. These undermined, for one thing, the extended family. Families had to be mobile, ready to move to new jobs; they could not carry kinsfolk along. The bond between fathers and sons also broke down, as the apprentice system gave way to specialized factory work.

As the factory displaced cottage industry, so agribusiness displaced the family farm. ______ Though agrarians fought to save it, the family farm succumbed to the cycle of ______ mechanization, debt and overproduction. Nor could ______ the family itself offer a haven

from the heartless outside world. The rules of commerce turned marriage into a mere contract that either party could annul. Parents could not shield their children from market values, including glamour and power; via television, junk values like junk foods, invaded their homes. Overproduction led to the cult of instant satisfaction. But the goods could never satisfy, due to built-in obsolescence and ever-changing fashions.

Two related factors helped undermine the family: the loss of workers' skills and of traditional values. Mass production

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demanded machine minders, not skilled artisans. It created wage slaves bereft of their skills as well as control of their tools. The move to big industry, however, was not, as some would argue, inevitable. As various scholars point out, economic growth did not require large-scale production. That represented a collective

Meanwhile parents were losing experience of bringing up children, housekeeping, or nursing the sick: during their own youth, these functions had been handed over to others.

> choice, though one made obscurely in "uncountable small conflicts". Lasch shows that many workers and thinkers were quite aware of the long-term costs of turning craftsmen into employees. Nineteenth-century populists saw clearly how the end of job satisfaction would lead to consumerism. Against the democracy of consumption, taken for granted today by both socialists and union leaders, they argued for a democracy of self-reliance, competence, and informed participation in the commonwealth.

Junk values like junk foods, invaded their homes via the television.

The health of the family, in other words, depends on the health of the world of work, politics, and the community. The leaders of early labour movements, Lasch points out, were not proletarians but artisans. Craftsmen, small businessmen and yeoman farmers made common cause against big industry. This populist revolt is seen as 'primitive' and 'premature' by Marxists, who believe that only the proletariat can make a revolution; and thus that mass production is a necessary step to wealth and freedom. But this view in effect reduces the working class to an interest group fighting for control of the system, not for major change. Artisans and farmers were more revolutionary in resisting the factory system as such. They wanted to save their crafts, communities and values. Historians, says Lasch, now agree that artisans led the

> fight against industrialization. Militant unions grew only in industries that had an artisan background.¹⁴

Lasch draws support for his thesis from many thinkers, from Jonathan Edwards and Emerson down to William James and Reinhold Niebuhr. He points to the defence of democratic

small-scale "producerism" in Locke, Paine, Cobbett, Carlyle and Ruskin. In America, such thinking blended Puritan, Calvinist, republican and populist traditions. Its distinctive traits were "a defence of small farmers, artisans and other 'producers'; opposition to public creditors, speculators, bankers and middlemen; opposition to the whole culture of uplift and 'improvement'; and an increasingly detailed and eloquent indictment of humanitarianism, philanthropy, moral reformation and universal

> benevolence – the 'comforting system', as Cobbett scornfully called it." Many of these values survived into our century, particularly in America's blue-collar class.

Lasch offers no easy solutions. We confront limits.

The Earth itself is finite. But he does point to useful guides. We can find moral inspiration, he believes, in the prophetic and populist thinkers who questioned "progress, enlightenment and unlimited ambition". Unlike progressive spirits, they recognized both moral and material constraints. Only such a revival of selfdirection and self-control, rooted in the family, can stem the tide toward insensate consumption, on the one hand, and takeover by the superstate, on the other.

by Grover Foley

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Local Futures

SHORT CIRCUIT; Strengthening Local Economies for Security in an Unstable World by Richard Douthwaite

Green Books, Totnes, 1996, 386pp, £14.95. ISBN 1-870098-64-1.

nvironmentalists often lay themselves open to the charge of utopianism. Richard Douthwaite breaks from this mould in his review of schemes devised by dying communities seeking to unhook themselves from the global economy over which they can never have any control or influence. In Short Circuit Douthwaite makes the transition from polemic to practical. The bulk of the book describes a range of inspiring locally-based initiatives being adopted by diverse peoples across the globe. The ventures described embody a common desire to resist, or to break away from, an unsustainable global market which is bringing material and cultural poverty to us all, and which has assumed and taken over the role traditionally fulfilled by the locality. In addition to Local Exchange Trading Systems (LETS), co-operatives, community-based enterprises and 'time-dollar' systems, examples of which may occasionally achieve coverage in the popular press, Douthwaite's compendium includes details and contact addresses for country markets operated by the Irish Countrywomen's Association (ICA) and Women's Institutes (WI), the Village Retail

Services Association (ViRSA) which enables communities in the UK to retain or reopen local shops, crofters and community land trusts, local brewing, information on renewable energy and new systems of production and distribution of locally grown organic food, like the so-called box schemes in the UK, "community supported agriculture" in the USA, and a host of similarly successful ventures. Practice and theory are intertwined, with references to the work of Henry George, Schumacher and other leading figures in the sustainability debate.

Global corporations can today use technology to dispossess the poor of the very necessities of life on a scale which has no precedent. Using the stick of unemployment and even greater powerlessness, the global elite offers a "freedom to starve" which was absent in most rural peasant societies of the past. Without a re-adjustment to a cultural diversity of local community economies, the cancerous industrial system will create a bleak future for the vast majority of people. The stark choice will be between employment in a "large, highly-pressured firm scrambling for its place in the world market, a firm to which we can rarely make an individual contribution and matter as people not at all" and virtual (or actual) starvation.

If Douthwaite is correct, and there is precious little evidence of a contrary view in the mainstream press or academia, his review of the alternatives is refreshingly up-beat. It is all too easy to overlook the fact that for the vast majority of our history, communities were self-sufficient in subsistence essentials: trade was in non-essentials and luxury goods. Until well into the present century urban centres were substantially dependent upon their hinterlands for fresh produce. Within a single lifetime communities like the island of Inishbofin, on the west coast of Ireland, have shifted from self-sufficiency in provision of food, clothing, tools and other essentials to total dependence upon the global cash economy and its packaged and processed products. Like Inishbofin, communities across the globe have been powerless to resist the deskilling march of progress'. Indeed, dependence today is such that a slight breakdown in international trade or restrictions on oil would devastate marginal and even not so marginal regions. Douthwaite's message is, however, one of hope.

Short Circuit is no academic text designed to appeal to the intellectual and destined to gather dust on library shelves. Rather, it provides a vital stepping stone from the world of environmental protest to the new scene of grassroots economic action. Complete with references and addresses, this tool kit for action in the fields of finance, food, farming and fuel is relevant to every locality across the globe. Ecological security may well lie, as Douthwaite argues, in local diversity and autonomy. Realistically, no single system or global framework can hope to protect the range and variety of genetic resources capable of constant adaptation to varied climatic, seasonal and geographic factors. Saving small farmers within their many and varied localities is the key to the preservation of biological diversity. Douthwaite observes that the power to exercise options at local level must be rooted in cultural diversity, a diversity which is being eroded by a global culture and the global economy which it supports.

Douthwaite's advocacy of a regeneration of social institutions rooted in locality and of a scale capable of being controlled by people acting in and affected by them deserves wide consideration. The "damage caused by the death of morality's rural roots" is most unlikely to be repaired by a global technofix. Douthwaite presents the alternative scenario, detecting signs of a revival of local co-operation and mutual help. In locally based economies the individual's ability to exploit nature and society for selfish ends is curbed by known social actors. Douthwaite notes the re-emergence of peasant-style economies in which families owning their own means of livelihood can fight free of the global market-place, despite the odds. However, the global market-place cannot be expected to sail off into the sunset at the stroke of a pen.

A good read and a valuable resource, Short Circuit deserves a wide circulation among all who entertain a sneaking suspicion that economic 'progress' is an illusion. It marks the opening of a new era of debate on the alternatives to a single global economy.

by Frances Hutchinson

Frances Hutchinson is a researcher into sustainable economics, based at Plymouth Business School and Bradford University. Her recent publications include *Environmental Business Management*, published by McGraw-Hill, and *The Political Economy of Social Credit* and Guild Socialism, published by Routledge.

Global financial madness

ONE WORLD, READY OR NOT: The Manic Logic of Global Capitalism by William Greider

Simon and Schuster, New York, 1997, pp.528, \$27.50 (hb), ISBN 0-684-81141-3.

ooks on globalization tend, on the whole, to be worthy but heavy going. It is therefore a delight to read something that is really worthwhile, but thankfully not treaclelike in density. In the first half of his new US book One World, Ready Or Not. Rolling Stone editor William Greider documents how the transnational company migration to cheap-labour countries will result in a massive cutback in jobs in the rich countries with little significant improvements in the living standards of the vast majority in those poorer countries. He also points out how this is leading to a staggering over-capacity in production, the same fundamental disorder which led to the Great Depression. In the second half of the book, Greider demystifies the activities of transnational corporations and calls for a whole raft of government controls to put an end to the terrible destruction wrought by the global economy on a natural environment and the social fabric of global society.

What makes this well-written book unusual is that its conclusions were reached after the author toured 12 countries in Asia, Europe and North America interviewing factory workers, corporate heads, economists and government officials. These interviews result in a series of well-written illustrative anecdotes and clearly contrast what are often perceived as 'opportunities' provided by the expanding global system (e.g. hightech capability in remote regions) with the enormous instabilities and contradictions that have arisen (e.g. almost total environmental degeneration in some parts and general societal breakdown in most). Unusually, these contradictions are discussed in the book with multinational managers who explain how, in the context of the global

economy, there is a necessity to maximize their companies' international competitiveness and hence their shareholders' profit levels.

The clear message that emerges from his analysis and supportive examples is devastating both for the future of workers in the North and for the hopes of the poor majority in the so-called Tiger economies. The myth peddled by free marketeers and others about job movements to lower wage economies is that the process generally occurs in companies producing low-tech goods, that it doesn't happen that much and that it will in any case mean that poorer countries will get richer and buy all the high-tech goods and services from the North's retrained workforce. Greider's book blows such ill-considered nonsense out of the water. Using China as an example, he shows that whilst today their exports tend to be toys, footwear and clothes, they do not plan to stay at this level. The country's next goal is self-reliance in, and massive export of, items such as cars, aircraft, steel, petrochemicals, computers and telecommunications.

China is on the way to achieving this. As the price of gaining access to its potentially huge market, China understandably demands that transnational companies transfer technology and R&D skills in joint ventures, so that increasing percentages of components are made locally. There was a time when China merely made engine mountings or cargo doors for Boeing aircraft. Now they are about to make complete tail sections for 1,500 planes, including Boeing's most popular model, the midrange 737. They are also about to open Boeing's first ever foreign subsidiary, Boeing China, with a \$600 million commitment of capital.

American trade unions have already woken up to these trends. The Boeing machinists' strike in Seattle was not about wages, but about job security in the light of their companies' accelerating outsourcing of production work to poorer countries, particularly China. Similar strikes have occurred in McDonnell Douglas and General Motors. European trade unionists should be alert to the fact that Airbus is now following Boeing into China, and making ever more components there. Volvo followed Mercedes-Benz with joint ventures in the bus market. Siemens is to make express trains. Volkswagen was in first, now followed by other car producers such as Ford and General Motors, Toyota and Nissan.

Perhaps this might not be so threaten-

ing if the wealth of the rich countries were used to ease the transition for Northern workers as the price for a laudable improvement in living standards for the majority in the South. The reality is that neither of these things is happening. Greider foresees for example a China with perhaps 200 million affluent consumers. Co-existing with these will be a labour pool of around 1.2 billion workers, whose numbers will keep wages low. However, with technology transfer and automation they will be able to beat OECD competition and increasingly dominate the markets in Europe and the rest of the North in a huge range of goods.

China is not inviting all these transnationals in merely to meet the demands of perhaps 200 million comfortable consumers (the rest of the population will be mostly out of the loop). They want to be self-reliant. However, they also want an increasing share of world export markets, particularly in the higher-tech areas. Should China fail, then Greider's travels have shown him that India, Brazil and countless other nations would take over and achieve these same goals.

In the second half of the book Greider's knowledge of the financial system and its influence on politics comes into play (building on his earlier book Secrets of the Temple: How the Federal Reserve Runs the Country). He draws ominous parallels with the financial instabilities of the late twenties. The 'casino economy', in which financial assets are growing twice as fast as the underlying economy itself, is well covered. What is less well realized and is examined in depth by Greider is one of the key weaknesses of globalization the coming worldwide mismatch between unlimited supply and constrained demand. Ever freer trade, with its emphasis on cheap labour, automation and less money for labour-intensive public sectors does indeed supply cheap goods and services, but in the process reduces demand. More and more once relatively affluent consumers are losing their once secure jobs, have no work or are underemployed and will buy less. That's when big companies, and not just working people, will start to feel the pain as their markets die.

This will then provide political openings. Greider is clear that if we don't learn from the lessons of the thirties, then the future will be one of increasing turmoil and suffering. He proposes a number of steps to avert this. These are refreshingly heretical. He calls for

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increased government controls over the activities of transnational companies. What a relief at a time when most commentators from all sides of the political spectrum either avidly support, or have capitulated, to business's call for selfregulation as the major way forward. He goes further than the usual calls for a Tobin tax to reduce cross-border capital flows and increase stability in money values. This he sees as a "necessary predicate" to the broader reregulating of finance capital in order both to stabilize financial markets and to make capital owners more responsive to the general needs of the producing economies.

He calls for governments to "reimpose some of the control measures that they discarded during the last generation." These include tightening terms for easy credit and crippling or closing down offshore banking centres which allow tax and regulation avoidance by prohibiting domestic banking systems from honouring the transfers of offshore capital.

In terms of influencing the activities of transnational companies, Greider calls for the moderation of flows of goods by imposing emergency tariffs to rectify trade deficits. To protect the planet adequately, the environmental costs of economic activities must be taken into account. Finally he calls for a new spiritual ethos, one which draws on economic thought, religion, philosophy, environmentalism, the labour movement and the arts.

One fault of the book is that it fails to give very many pointers as to how politically and socially this increased control over big business and finance will be achieved. But at least it breaks the tedious mould of so many books which document the problems we face in great detail and then end with a few inadequate generalities on what to do about them. Greider's book contains plenty of ideas. Also useful is its clear explanation of the workings of the financial system. Perhaps the book's most important contribution is Greider's grasp of the coming crisis of inadequate demand. This is inevitable in a world of increasing automation, relocation to ever cheaper labour areas with ever cheaper labour and reduced tax revenues. This book really is invaluable for those of us looking for practical arguments and ideas to help bring about the radical changes required to dismantle the corporate monopoly that has taken over those functions which rightly belong to the community.

GNP as an Indicator of Hopelessness

TOWARDS A SUSTAINABLE ECONOMY: The need for fundamental change by Ted Trainer

Jon Carpenter, The Spendlove Centre, Charlbury, Oxford, OX7 3PQ and Envirobook, Sydney, 1996, 10.99/US\$15.95 (pb), 186pp. ISBN 1-897766-14-9.

This is a succinct, compact, yet comprehensive statement of the environmental crisis we face today and how it can be solved. It is totally realistic and very outspoken. The author notes just how the market cannot conceivably solve our problems, and what a total failure the idea of 'trickle down' has been as a means of dealing with the growing problem of world poverty. He fully accepts that development cannot solve our problems, and that many of the challenges required would necessarily reduce rather than increase GNP.

GNP since the 1950s has increased by two and a half times in Australia. If the current ideas were correct, then all Australia's social and environmental problems would have been solved, but, on the contrary, in the decade to 1990 alone unemployment has doubled, the farm debt multiplied by nine times, and the foreign debt by ten. At the same time, national independence has been drastically reduced with the huge increase in foreign ownership of the means of production, and ecological conditions have deteriorated alarmingly.

Ted Trainer provides us with a lot of interesting insights. Take an example: he points out that the economy is addicted to an increasing rate of development. This is so because productivity, i.e. output per hour of work, is increasing at about two per cent per annum, which means that each 35 years we could cut the working week by half while still producing as much as we were before. He notes that a number of OECD countries could have cut down from a five-day working week to a one-day working week in the last 25 years, while maintaining their output at the same 1970 level. This means that we all have to double our consumption every 35 years just to prevent unemployment from rising, and to avoid a reduction in the productive outlets available to soak up investable capital. He also points out that the amount of capital per person that is available for investment in the US is increasing at 3.6 per cent per annum, which means that it will double every 20 years. This means that unless Americans double the volume of goods and services they produce and consume every 20 years, they will be in serious difficulties.

The solution he proposes to our problems is as realistic as is his analysis: we must simply phase out the global economy and return to a much more local and small-scale economy based on the human community. There is clearly no alternative.

by Edward Goldsmith

Identity and Place ALTERNATIVE WORLD by Nares Craig

Housman's Bookshop Publications, London, 1997, £7.50 (pb), 251pp. ISBN 0-85283-251-6

s the title suggests, this book is a blueprint for achieving Craig's vision of an alternative world. The first part of the book necessarily lays out the reasons why such a need exists, and is done terrifyingly well. Armed with countless facts, Craig exposes the hopelessness and stupidity of the path we are currently pursuing. "The World is so seriously sick, in so many different respects, that its illness will soon become terminal unless fundamental changes are made." For example, the Samaritans, he tells us, received nearly a million more calls in 1990 than they did in 1980, 72 per cent of which were suicide-related. The future of our health is also grim. The UK saw a rise in the cases of TB between 1987 and 1991, and skin cancer is enjoying a special boom the world over, as are numerous other forms of often unprecedented cancers.

As Craig explains, it is time to acknowledge that major international development institutions are incapable of anything other than fuelling the further globalization of an out-of-control local economy and thus the very process which is undermining our existence. As early as 1950, World Bank president Eugene Black made it clear that foreignaid programmes were designed solely to benefit American business, by: "providing a large and immediate market for US goods and services; stimulating the development of new overseas markets for US companies; [and] orienting local economies towards a free enterprise system in which US firms could prosper"; in other words, colonialism in fresh clothes. This should come as no surprise

by Colin Hines

of course. The emerging multinational/ global industries by their nature required global homogenized markets in which to pump their products and services. From the beginning, it was the purpose of the World Bank, International Monetary Fund and, later, of the successive free trade agreements and the World Trade Organisation to maintain and propagate those conditions conducive to multinational expansion. As John Vidal has pointed out, many of the multinational corporations which dominate these institutions "now control larger development budgets than half of Africa and negotiate like nations." So we are now living an unprecedented experiment, one which has been proved a failure and yet is guarded, protected and reinforced structurally by the status quo.

Craig's vision of the future is one which draws only marginally from the past and is based on "totally new ways of ordering our lives." This is surprising in that for 99 per cent of our existence on Earth we have managed to live more or less in harmony with our surroundings and each other and that every problem area which he points to is either wholly new or else vastly worse within the context of human history.

Drawing therefore only on relatively modern human history, Craig sees just two paths – free-market capitalism, which he convincingly and successfully demolishes, and 'democratic socialism'. Both options, however, represent the modern trend towards monoculture and universalization, and both are in conflict with Leopold Kohr's principle that "wherever something is wrong, something is too big."

In Craig's Alternative World, for instance, all things "natural or man-made [would] belong jointly to every world citizen." He suggests also that human rights should be globally standardized, as should a general system of education. In so doing, he essentially denies the diversity on which human societies have always thrived, and forgets that these concepts mean very different things to different cultures. As Aidan Rankin has pointed out, "The struggle for indigenous peoples' rights is not about rights in the narrow, Western liberal sense - the 'right' to participate in a global market place, or the 'right' to citizenship of an irrelevant state. Indigenous peoples' rights are about land, community and self-determination, the rights of people to preserve their distinctive cultures and identities."

Modern history has shown us that nothing can be globalized except perhaps resistance to globalization – that the global management of local cultures and environments can only lead to disaster. The 1978 Sioux, Navajo and Iroquois declaration emphasizes this point: "Our roots are deep in the lands where we live. We have great love for our country, for our birthplace is here. The soil is rich from the bones of thousands of our generations. Each of us was created from these lands and it is our duty to take care of them, because from these lands will spring the future generations of our people."

In parallel with these grand plans of global management, however, Craig makes an essential point – that the nation state is an artificial idea and one which has only ever led to the creation of empires, which in turn by their nature are unable to accommodate diversity. This he emphasizes by quoting Amos Oz: " ... upon this ... planet ... there should exist hundreds of civilizations, thousands of traditions, millions of regional and local communities – but no nation states."

An enormous amount of research has gone into putting together this wideranging and example-rich critique of industrial society. For anyone in any doubt that things are going to have to change fundamentally for our basic survival, the book is convincing.

by Zac Goldsmith

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Letter Forum



"Factual errors and misinformation..." Norman Borlaug defends the Green Revolution.

I recently read with interest and considerable dismay the article you published entitled "CGIAR: Agricultural Research for Whom?" (The Ecologist Vol.26 No.6, November/December 1996). The article contains many errors of fact and interpretation, and is clearly not an unbiased treatment of some exceedingly important and complex issues. But what bothered me even more than the misinformation contained in the article was the clear implication that there has been little or no payoff to poor countries, such as India, of the Green Revolution in wheat and rice. Given the facts of the Indian case alone (many other examples could be cited), how could the author possibly arrive at that conclusion?

By the mid-1960s, India's population had reached about 465 million, localized famines were already happening, and widespread hunger and malnutrition were imminent. The doom-sayers of the day were predicting a famine of unprecedented proportions throughout South Asia. The Green Revolution wheat and rice varieties that were introduced in the mid-1960s not only staved off this desperate Malthusian scenario, but have enabled India to build grain reserves of 20-30 million tons; in fact, they have maintained these reserves against inclement weather and other disasters for more than a decade now, even in the face of a near doubling of their population (to about 940 million today)! Tell me again how there has been no impact of the Green Revolution in India.

Let me be clear: I do not advocate nor condone the kind of population growth that India has experienced. But I have always maintained that our responsibility as agricultural scientists is to buy time, so that educational, religious and political leaders can attack the complex issues of rapid population growth and rein in the "Population Monster" that I spoke about in accepting my Nobel Peace Prize in 1970. To my knowledge, there are few environmental groups who seek to stem the rising tide of humanity. I sincerely applaud the efforts of those who do. But I cannot and will not stand idly by and watch millions starve when it is within my power and the power of modern agricultural science to prevent such an immoral catastrophe.

It seems to me that a responsible journal like *The Ecologist* is obligated to present a more balanced view to its readers than does this particular article. When it comes to the environmental and social impacts of agricultural development, poverty, population growth, and a myriad of other elements affecting the human condition, we are clearly all in the same boat, and we had better start rowing together, at least in the same general direction, before it is too late for all of us.

Norman E Borlaug

Nobel Peace laureate International Center for Maize and Wheat Improvement, Mexico



...Dr Vandana Shiva responds

Norman Borlaug's dismay at the article on the CGIAR system which gave a realistic analysis of the costs of the Green Revolution is understandable. Borlaug is supposed to have created a 'miracle' - a task usually left to gods and saints, not to scientists. He still seems to be under the impression that it is his "power and the power of modern agricultural science" which has saved Indians like me from starving. Scientists who start seeing themselves in the role of god cannot tolerate an honest and realistic evaluation of the impact of their work on nature and on people.

Borlaug's letter perpetuates five myths on which the 'miracle' of the Green Revolution rests. The first myth is that India was unable to feed herself till the Green Revolution was launched. The second myth is that American scientists like Borlaug were dedicated only to preventing starvation and not to promoting the use of chemicals. The third myth is that the increase in wheat and rice production through monocultures is an increase in overall food production and nutritional availability. The fourth myth is that the Green Revolution is an efficient way to provide food in a country with a large population and low resource availability. The fifth myth is that India's grain reserves are exclusively the result of the Green Revolution, and will continue to exist in preparation for possible future disasters.

Borlaug is supposed to have pulled

India out of a 'ship-to-mouth' existence and transformed India from 'a begging bowl to a bread basket'. However, India has been an agricultural society for more than forty centuries. In 1889, Dr John Augustus Voelcker was commissioned by the Secretary of State to India to advise the imperial government on the application of agricultural chemistry to Indian agriculture. In his report to the Royal Agricultural Society of England on the improvement of Indian agriculture, Voelcker stated: "I do not share the opinions which have been expressed as to Indian agriculture being as a whole backward and primitive, but I believe that in many parts there is nothing that can be improved. I may be bold to say that it is a much easier task to propose improvements in English agriculture than to make really valuable suggestions for that of India."

Borlaug went to India with the same task as Voelcker – to apply chemicals to Indian agriculture. Unlike Voelcker, however, he did not show humility. Instead he is convinced that before him Indians did not know how to feed themselves. As he writes in his letter, "famines were already happening and widespread hunger and malnutrition were imminent."

The last famine India had experienced was in 1942, during British rule, which killed 2 million people. Famines were a legacy of colonialism. The famine in 1717 killed 10 million people, but as Warren Hastings wrote to the directors of the East India Company, revenues collected by the British in that year were higher than earlier years. In the 1960s when Borlaug was trying to introduce chemical agriculture and his new seeds, India was not suffering from famines. Independent India did not have any famines, although in 1966 it did have a severe drought.

Food imports to India were as low as 711,000 tons in the mid-1950s. Borlaug and other US experts had been trying to introduce the Green Revolution to India since 1963 but had faced major resistance from Indian planners. They finally got their chance in 1966 when India suffered a drought and was forced to import 10 million tons of wheat. The US exploited this scarcity in its use of food as a weapon and forced non-sustainable, resource-inefficient, capital and chemical-intensive agriculture on one of the most ancient agricultural civilizations of the world. American agricultural experts like

Borlaug did not introduce the Green Revolution to "buy time" for India. They introduced it to sell chemicals to India.

American companies were anxious to find fertilizer markets overseas. In 1967, at a meeting in New Delhi, Borlaug told the audience: "If I were a member of your parliament, I would leap from my seat every fifteen minutes and yell at the top of my voice 'Fertilizer! ... Give the farmers more fertilizer.' There is no more vital message in India than this."

When the Green Revolution was introduced, the foreign exchange was six times the total amount allocated to agriculture during the preceding period. This foreign exchange requirement was met through debts. Green Revolution-related debts accounted for two-thirds of India's national debt over time.

The third myth that Borlaug perpetuates is equating rice and wheat production with food-grain production. The growth of rice and wheat has taken place by the destruction of oilseeds, pulses and millets such as barnyard millet and finger millet, which are highly nutritious and resource-prudent crops. In terms of nutrition, the Green Revolution has actually led to a decline both by displacing more nutritious food-grains and by undermining agricultural production in areas not well endowed with irrigation and fertile soils.

The Green Revolution in fact focussed on the least nutritious crops. It could be said that the focus on rice and wheat alone was a kind of 'racism' projected to crops, with white grains being considered superior and dark grains 'inferior' or 'marginal' crops in spite of being more nutritious. If we look at nutrition per acre, Borlaug's 'miracle' varieties did not yield more. Not only has this contributed to a decline in nutrition and the erosion of biodiversity, it has also led to soil and land degradation.

The Green Revolution led to and promoted the constant use of cropland under soil depleters like wheat and rice, rather than rotation with soilbuilding leguminous crops like pulses. As Kang has cautioned, "This process implies a downward spiralling of agricultural land use – from legume to wheat to rice to wasteland." 50% of Punjab's farmland is severely degraded. Micronutrient deficiencies are creating new plant diseases. Intensive irrigation has led to waterlogging and salinity in some places and groundwater-mining in other parts. Weed and pest problems are overtaking the monocultures, leading to increased use of herbicides and pesticides.

Further introduction of Green Revolution rice and wheat monocultures has led to the erosion of biodiversity. India used to grow more than 100,000 varieties of rice before the Green Revolution, many of which were high-yielding and all of which were more efficient users of water and had higher resistance to pests and diseases. Destroying the natural capital of fertile soils, abundant water resources and rich biodiversity can hardly be described as "buying time". It is selling the future.

The resource inefficiencies of chemical-industrial agriculture are now well documented. Indigenous agriculture based on biodiversity needs only 5 units of input to produce 100 units of food, whereas industrial agriculture requires 200 units of input to produce the same 100 units of food. In high-population, scarce-resource contexts it makes sense to use more resource-prudent systems to provide food and nutrition, rather than the more inefficient and wasteful ones. In this sense too Borlaug's prescriptions did not "buy time" for India.

Finally, Borlaug points to India's grain reserves as a result exclusively of the Green Revolution. These reserves would have been built up anyway as a result of investments in irrigation and pricing policies and support prices to farmers for distributing cheap food through the public distribution system. Today under the new wave of globalization and under pressure of the World Bank's structural adjustment programme, the subsidies for farmers and for the public distribution systems are being dismantled. Quantitative restrictions on food imports and exports are being removed under the WTO disciplines. India's food security is once again severely threatened. To create an alternative beyond the nonsustainability of the Green Revolution and the brutality of free trade in food, we will have to build our agriculture on principles of diversity and integraton to ensure that it is sustainable, conserves resources, and provides nutritional and food security while providing immunity to unstable and volatile global markets.

Dr Vandana Shiva

Director, Research Foundation for Science, Technology and Ecology, India.

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DIARY DATES

8-10 October 1997: GLOBAL FUTURES Conference, The Hague, THE NETHERLANDS. For further information, contact John Sinjorgo, Tel: +31 (70) 426 0766; Fax: +31 (70) 426 0799.

10 October 1997: EUROPE'S FOOTPRINT: European Foreign Policies and Sustainable Development, The Goethe-Institut, 50 Princes Gate, Exhibition Road, London SW7 2PH. For details, contact Carole Sterckx, Tel: 0171 411 3400; Fax: 0171 581 0974.

11 October 1997: ECO's ETHICS CONFER-ENCE. Conway Hall, Red Lion Square, Holborn, London. Tickets £10, (payable to ECO) available from The Campaign for Political Ecology, 42 Rose Terrace, Horsforth, Leeds, LS18 4QA. Tel: 0113 259 0812.

17-19 October 1997: MARINE CONSERVA-TION SOCIETY CONFERENCE. University of Warwick. For full programme and booking form, send SAE to: Marine Conservation Society, 9 Gloucester Road, Ross on Wye, Herefordshire HR9 5BU. Tel: 01989 566017; Fax: 01989 567815.

18 October 1997: Oxford Oxfam's ONE WORLD FAIR. Oxford Town Hall, 10am-4.30 pm. For more information on this and the Oxford **One World** Week, contact Angela Macquiban, Tel: 01865 242665.

21 October 1997: One-day workshop Environmental Information on the INTERNET. Featherstone, Yorkshire. For information on this and other venues, contact Penny Pitty, Green Door Services, 1 The Whitehouse, 17 Brunswick Hill, Reading, RG1 7YT. Tel/Fax: 0118 956 7775

31 October-2nd November 1997: GLOBAL PART-NERSHIP YORKSHIRE, on broad subjects of Trade, Aid, Debt, Health, Conflict, Water. Leeds Metropolitan University Brunswick Building. 1pm-6pm. For further information on this and other events, contact Anna Craven, Tel/Fax: 01756 760265.

12-15 November 1997: ECOLOGICAL RES-TORATION AND REGIONAL CONSER-VATION STRATEGIES, Fort Lauderdale, USA. For more information, contact Society for Ecological Restoration, 1207 Semiole Hwy, Suite B, Madison, WI 53711-3726, USA. Tel: +1 (608) 262 9547; Fax: +1 (608) 265 8557; Email: <ser@vms2.macc.wisc.edu>

24-25 November 1997: THE FUTURE OF THE EUROPEAN RAIL INDUSTRY: Creating an Integrated Infrastructure for the 21st Century. Brussels, BELGIUM.

For more information, contact Mary Mavrogheni, Tel: 0171 453 2107; Fax: 0171 631 3214; E-mail: <Mary.Mavrogheni@ibcuk.co.uk>

11-17 December 1997: DRIVING THE WORLD. Orlando, Florida, USA. For more details, contact Pam Turner, Electric Vehicle Association of the Americas, 601 California Street, Suite 502, San Francisco, CA 94108, USA, Tel: +1 (415) 548 0311; Fax: +1 (415) 548 9764; E-mail: <firstopt@aol.com>

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