

The

Ecologist

Man and the environment ■ The Quality of life ■ Pollution ■ Conservation

Vol. 1, No. 12

June 1971

**Mining in Snowdonia ■ Onslaughts on Anglesey ■ Environmental
genetic hazards ■ Primitive peoples defended**



The rape of North Wales

PUT YOUR MONEY WHERE YOUR MOUTH IS

It is a fair bet that everyone reading *The Ecologist* is in some way or another concerned by the accelerating destruction of Britain's natural environment. It is also a fair bet that all of us from time to time have publicly or privately deplored the seeming omnipotence of huge corporations, and the irresponsibility that such power engenders.

The time has come to stop bleating about it. A handful of international mining consortia, in a desire to maximise short-term profit, are currently intent on laying waste to the Snowdonia National Park. The aim of Friends of the Earth, put simply, is to stop them.

To do this we will require money, and it is for this purpose that the **SNOWDONIA DEFENCE FUND** has been established.

If Snowdonia is desecrated the blame will not be entirely attributable to Lord Byers—it will be your fault too. Give us enough money to engage lawyers, planners and the like, and we'll do the rest.

By making out a cheque to the Snowdonia Defence Fund, and sending it to Friends of the Earth, 8 King Street, London, W.C.2., you will be putting your money where your mouth is—and right now it's action we want, not words.

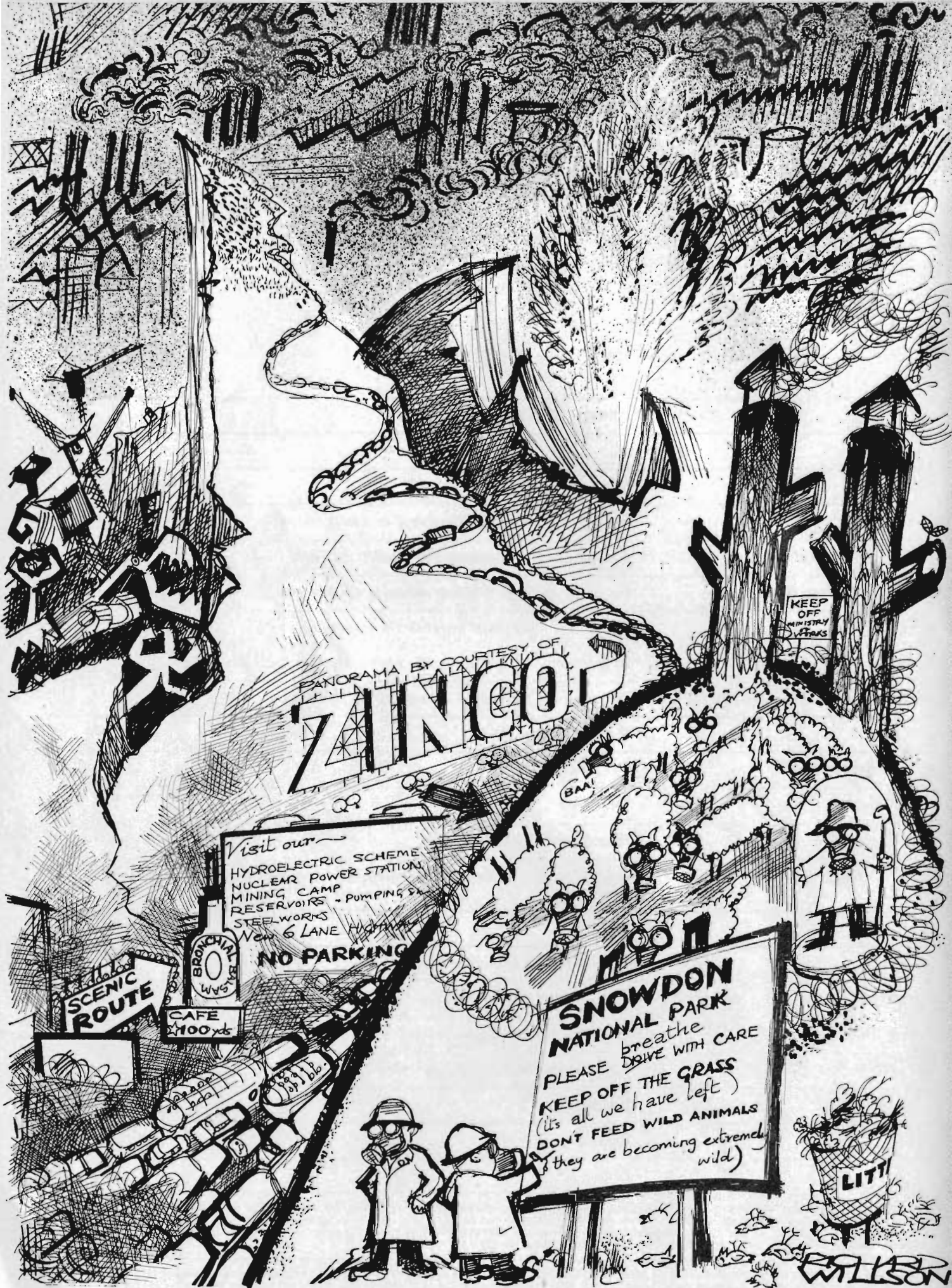
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"They'd better hurry, it may not be there tomorrow."

The rape of North Wales

This month's issue is exceptional in that we devote a considerable proportion of it to North Wales—specifically to Snowdonia National Park and to Anglesey with its lovely coastline, much of which is an Area of Outstanding Natural Beauty. We do so because in spite of these designations both areas are under intense pressure to develop in the most destructive and short-sighted manner possible. In Snowdonia, Rio Tinto-Zinc want to mine gold and copper—and other mining companies are hard on their heels. In Anglesey, an aluminium smelter (largely owned by RTZ) has just been built and emissions from it are already causing a great deal of distress. In addition, Shell plan a large oil terminal there so that heavy bouts of pollution threaten not just the Anglesey coast but also the mainland and its highly popular tourist resorts.

The industrial protagonists and their “voices-off” see the issue as essentially one of “jobs or beauty”. Yet once this beauty goes it is gone for ever, while the few jobs brought to the region will not long remain there.

North-West Wales has a serious unemployment problem, worse than that for Wales as a whole, which in turn is about one and a half times to twice as bad as the average for Britain. But it will not be solved by glamorous construction projects like the aluminium smelter and oil terminal in Anglesey. As the Welsh Council's latest report, *A Strategy for Rural Wales*, explains: “In North-West Wales this labour force has been employed mainly on the construction of two nuclear power stations at Trawsfynydd (in Snowdonia National Park) and Wylfa (in Anglesey), a major pumped storage scheme at Ffestiniog and later the construction of the RTZ smelter at Holyhead... While a significant proportion of the constructional labour force on these major projects are migrants, most of whom may move to other projects as existing ones are

completed, these constructional operations are also an important source of local employment, and employment problems are likely to arise in the localities affected as these projects are completed”.

In the end, RTZ and Shell are likely to employ only a small proportion of the local labour force (and much of the skilled work will go to outsiders), and the net effect will be to exacerbate local unemployment problems as the construction workers are laid off.

Nor will mining operations like those proposed for Snowdonia be of any help. Indeed, the extractive sector is notorious for creating communities around it which are abandoned once the mines are worked out. Copper and gold may help today, but they will leave behind them a far worse problem in a generation's time.

What is particularly alarming is that both projects seem to have been rushed through with barely the minimum of consultation. The smelter was foisted on the unwilling islanders by a small but vigorous minority, and they are threatened with the oil terminal in the same way. Similarly, environmental safeguards, such as they were, do not appear to have survived the public enquiry. A discrepancy in sales or profits forecast of the same order of magnitude as that between the level of emissions promised at the enquiry (and backed by a forbidding display of plans and calculations) and that achieved now would have led to meetings with aggrieved shareholders, violent upheavals within the company—certainly not to bland assurances that everything is perfectly proper.

As for Snowdonia, it should go without saying that, unless it is a matter of life and death, mining is incompatible with a National Park. Unfortunately, the Welsh Council, in both its report on Rural Wales and that on *An Economic Strategy for North-West Wales*, equivocates over this. While allowing

that “the scenic beauty of upland Wales offers great potential to tourism, and firm policies of conservation are essential”, it also recognises that mining is highly lucrative. But with today's sophisticated extractive methods it is unlikely that the inhabitants of Snowdonia will benefit quite as much as RTZ's shareholders. What is unquestionable, however, is that the effect on the landscape will be irreparable—a landscape which, as the Welsh Council points out, is not merely a basic resource of the tourist industry but is also a “national heritage which should be handed on to succeeding generations”.

For Anglesey and Snowdonia, as with the rest of North-West Wales, the future lies in tourism and light industry. Indeed, employment in the manufacturing and services sector has expanded much more than any other—by 45.2 per cent between 1959 and 1969. But if this future is not to be lived out in a blighted environment, they must be helped in their fight to keep out the clumsy giants of the oil and mining worlds. The struggle is unequal: the puny local resources against the might of international companies. But the locals have learned one lesson—which should be noted by everyone facing similar threats to their environment—that assurances of safeguards are not to be believed. They must be spelt out in detail and guaranteed.

Now that Anglesey's aluminium smelter has been built, proper standards for emissions must be agreed with the residents. And there is time (though not much) to save Anglesey from the terminal and Snowdonia from the attentions of RTZ *et al.* Both issues still await a careful consideration by the local authorities of the real benefits they are likely to bring to their people, and a much more public appraisal of their dangers. It is essential that public pressure be brought to bear on Parliament, and on the Government Departments concerned, to see that this is done.

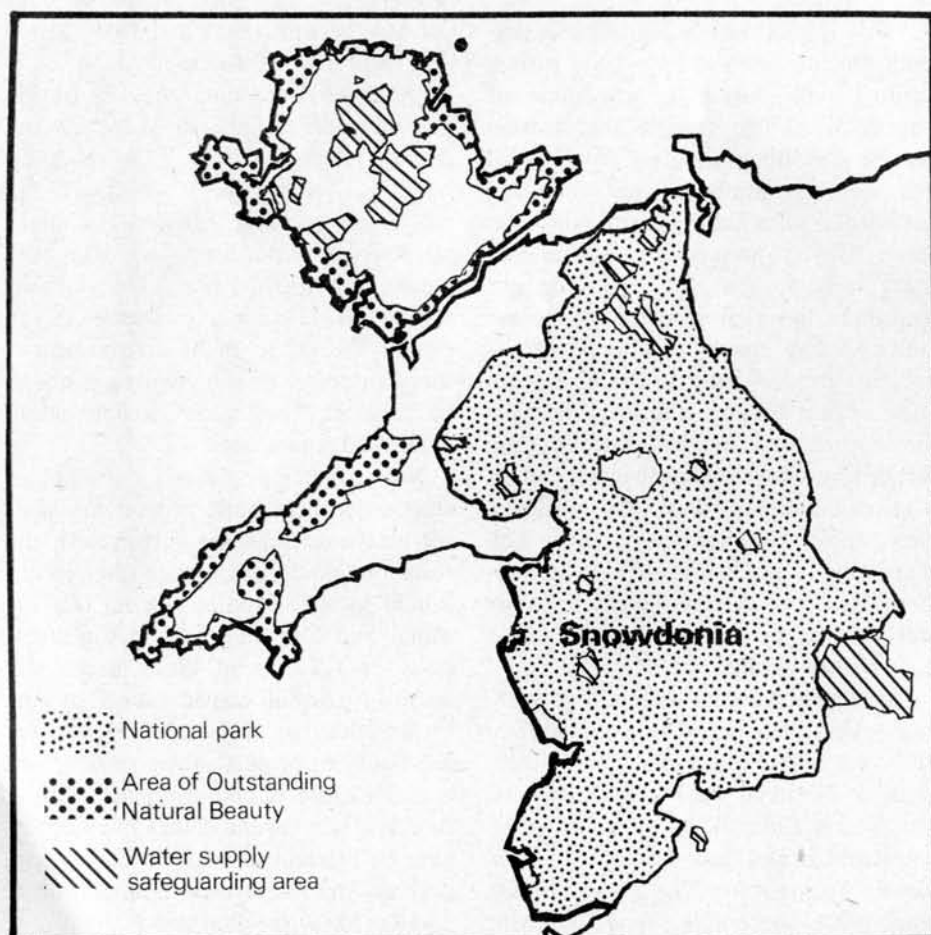
Mining in Snowdonia

"The wicked flee," wrote Charles Parkhurst, "where no man pursueth, but they make better time when someone is after them." Friends of the Earth invite you to join the chase.

Ten designated National Parks cover nine per cent of the area of England and Wales. In general the Parks are privately owned, marginally farmed, locally administered, and so unprotected that not one of them qualifies for inclusion in the United Nations List of National Parks and Equivalent Reserves. Yet these Parks contain our most beautiful, varied, and fragile wild land. It is their misfortune, and ours, that they also contain most of Britain's reserves of nonferrous metal ores, and that British law and policy presume that mining is in the national interest unless proved otherwise.

In the 845-square-mile Snowdonia National Park, the exploitative economy and the National Park idea are colliding head-on. Giant mining consortia, sometimes combining their offers with the threat of compulsory purchase, have bought exploration options for most of the Park, and are prospecting widely for copper, zinc, gold, lead, manganese, silver, and other minerals. One company has already applied for permission for extensive trial-borings—a test-case crucial for Snowdonia and for all other National Parks. Within the next year or two, the Government will probably have decided whether to allow large-scale mining in Snowdonia.

We have singled out one company, Rio Tinto Finance and Exploration Ltd (which we shall call RTZ because it is a subsidiary of The Rio Tinto-Zinc Corporation Ltd, an English holding company with annual turnover well over £300 million) because RTZ is ahead of its competitors in Snowdonia, and its plans are therefore easier to find out about than theirs. RTZ has not formally proposed any development in Snowdonia beyond prospecting in two areas (the Mawddach estuary and Coed-y-brenin); but if, as seems very likely, this exploration is allowed and reveals deposits of economic interest, RTZ will wish to extract them. Our description of how this would have to be done is based on published statements (oral and written) by RTZ officials and on the limits of known mining technology. RTZ can deny that it definitely plans to do the things we describe, but we do not say it does. We only say that extraction, if it occurs, will take certain forms. We have tried to minimize any distress our speculations may cause RTZ by founding them firmly upon known facts.



When is a Park not a Park?

The boundaries of the Snowdonia National Park, though drawn in 1951 to exclude past mining and quarrying devastation, include most of the 300-square-mile Harlech Dome, long known to contain huge deposits of nonferrous metals such as copper. Recent price rises and consequent refinement of mining technology have made economic the mining of these relatively poor ores ($\sim 0.5-1.0$ per cent). The profit-margin will continue to rise: RTZ's present exploration in Snowdonia is probably more a hedge against future competition than a prelude to immediate extraction.

Whether mining could ever be allowed in National Parks was argued at length when the Bill for the Parks was introduced in 1949. Unfortunately, the test urged by the Hobhouse Commission—that proposed mining must be “of vital national importance” and “of proved national necessity”—did not become law. The Parks' normal status as “white areas” (expected to have no substantial development) was instead left at the mercy of Park administrations, control of which was originally

supposed to be held by the National Parks Commission but in the event was usually ceded to local authorities and, in a few cases, to the Secretary of State.

During the second-reading debate in 1949, the Minister of Town and Country Planning admitted that mining in a Park might someday have to be considered. But he laid down several conditions:

It must be demonstrated quite clearly [he said] that the exploitation of those minerals is absolutely necessary in the public interest. It must be clear beyond all possible doubt that there is no possible alternative source of supply, and if those two conditions are satisfied then the permission must be subject to the condition that restoration takes place at the earliest possible opportunity.

We contend that RTZ's potential operations in Snowdonia cannot meet any of these three requirements. To show this, we must first set out RTZ's stated and presumed intentions.

With the probable encouragement of the Ministry of Technology under the

previous Government, RTZ has been exploring two parts of the Park. First, seismic and resistivity studies in the Mawddach estuary (one of the most beautiful in Europe) suggest that alluvial sediments presumed to contain millions of pounds' worth of Merioneth gold may be accessible to modern large-scale dredging; RTZ has sought permission for test-boring to find out. Second, RTZ's illegal drilling of 48 holes in the dense forest Coed-y-brenin, further to the northeast, has already located at least one large body of copper mineralisation, and RTZ has asked for permission to continue drilling there. Both drilling applications were called in by the Secretary of State for Wales at the request of the Merioneth County Council, and were the subject of a public inquiry in Dolgellau on 15-18 December 1970. (According to the usual practice, no public record of the inquiry was made.) The Secretary's binding decision on the applications is expected in the spring of 1971.

A rape by any other name

The test-boring in the Mawddach would annoy residents for some months but

Snowdon Horseshoe from Uyn Mymbryr Uchuf



would probably cause only slight and transient ecological damage proportional to the extent of the drilling, to which RTZ has set no limit. Dredging, however, if permitted would be an irreversible ecological disaster. It would probably take several decades for one or more dredgers about 320×80×80 feet in size, floated either by dredging out a series of lagoons or by flooding the estuary with a barrage adjacent to the existing railway bridge. We are reliably informed that the barrage is the scheme more likely to be proposed if the test-boring results are favourable, though of course any method of dredging would ruin the extremely delicate flow-patterns of the estuary. A barrage would have to be backed by upstream dams to control flooding, and the estuary itself, deprived of tidal scouring, would become heavily silted—an effect already obvious since the pilings of the railway bridge reduced the tidal flow. A huge volume of tailings would be excreted from the dredger in hillocks that one day might subside.

RTZ has apparently had no experience of estuarine dredging, and cannot say (nor can anyone else) how it might change mineral-salt concentrations and other conditions. But it is obvious that dredging would turn the estuary into something else—something less attractive to residents, visitors, plants, wildfowl, and fish (including salmon and other species worth more than £40,000 a year to the landowners).

RTZ could not, of course, undertake to restore the dredged estuary, but would instead propose to “improve” it. This “improvement” might take the form either of “land reclamation”—filling the estuary for agriculture and confining Afon Mawddach in drainage channels fed by dams (“flood control”)—or of “water conservation”—turning the estuary into a freshwater reservoir or recreational lake. The latter scheme, with marinas, a major north-south trunk road on the barrage, and perhaps an improved harbour at Barmouth, could attract heavy political support.

Meanwhile, back in the woods...

RTZ has also asked for permission to drill an unspecified number of holes in Coed-y-brenin, which is described by its tenant (the Forestry Commission) as “a mountain forest of superlative beauty”, and whose dense mosaic of habitats makes it an important regenerative ground for birds and other wild-

life. The works that might eventually be carried out in this forest (less famous and less visible to tourists than the Mawddach) would be on an even larger scale than dredging, and even more disastrous both locally and as a precedent. And oddly enough, RTZ’s proposed drilling will be merely a continuation of a programme already well-advanced without permission and (for almost a year) without the County Council’s even being informed of it.

Over a period of nearly two years starting in January 1969, RTZ drilled four dozen scout and prospect holes in Coed-y-brenin, some to a great depth (said by residents and denied by RTZ to be 1,000 feet). RTZ’s contention that planning permission was not legally required for this work seems no more than face-saving sophistry. RTZ’s view of the law is not supported by the sources and authorities it has cited; is not shared by the Merioneth County Council, the Welsh Office, the Department of Trade and Industry, or our own counsel; and is hard to reconcile with RTZ’s request for prior permission for shallower and less extensive drilling in the open country of the Mawddach.

RTZ certainly cannot claim ignorance of the law after January 1970, when it was officially informed that permission was required. But though RTZ then prepared an application (filed in April), it also kept on drilling at a faster pace, with some of the drill-rigs running day and night and causing intense annoyance to residents. The County Council, though it eventually had the courage to oppose RTZ, was at first indecisive and never issued an enforcement order, so RTZ’s violation of planning law continued until the Welsh Office asked RTZ to desist in November 1970, presumably so that the Secretary would not have to decide whether to allow RTZ to do what it was still doing. The impropriety of RTZ’s past actions does not, unfortunately, bar a grant of permission to continue them legally.

If allowed to, RTZ will probably drill in Coed-y-brenin for another year, then file simultaneous applications for intensive exploration (costing several million pounds) and for eventual mining. This mining would be opencast and on a very large scale: probably from two to four pits about 200 acres in extent and several hundred feet deep would be worked for 15-30 years, with

the initial investment exceeding £40 million.

A simple calculation shows that a single 200-acre-by-100-yard pit worked for 25 years yields on average about 10 million tons of rock a year. It is not clear whether this rock (after considerable on-site processing) would be transported by some new means to South Wales for smelting or would be smelted locally; in either case the ecological effects would extend far beyond the square mile or two occupied by the mine itself.

The more the merrier: RTZ would promptly be joined by Noranda-Kerr (Noranda Mines Ltd plus Kerr Addison Mines Ltd, both of Toronto), Union Corp Ltd of South Africa, and possibly others. Ominously, even the mineral rights to the Secretary of State’s 13,000-acre Vaynol purchase (which includes most of the central and western Snowdon massif, the Pass of Llanberis, and the south-western side of the Glyder) were bought not by the Secretary but by a private mineral agent, Geochemical Remining Co Ltd. Several consortia, including RTZ, are now prospecting in other wild areas of Britain and Northern Ireland.

Loopholes

RTZ’s expertly managed appearance at the Dolgellau inquiry left little room for opposition. The muddled state of planning law makes it possible for an applicant to divide his proposal into artificially separated stages, and thus to present his plans a little at a time without reference to more than the immediate future. This admissibility of the pretence that plans that are necessarily incomplete do not exist at all makes planning inquiries have little to do with planning, but it is probably the law, and RTZ took full advantage of it by refusing to discuss anything beyond test-boring.

Furthermore, the Minister who determines a called-in planning application has to take into account all “material considerations”, but the courts have been so reluctant to construe “material” that in practice the Minister is normally the sole judge of his own terms of reference. His administrative discretion is absolute—his decision cannot be questioned in court—but it seems that his grounds for reaching the decision cannot readily be questioned either. This will continue to be the law until some landowner

wealthy and stubborn enough to go to the House of Lords suffers a direct legal injury as a result of a Minister's restricted views of what is relevant. The 1962 Town and Country Planning Act has removed most of the usual prerogative remedies against abuse of administrative discretion, so that even if a Minister breaks his own rules there are very few people legally entitled to challenge him. (The Merioneth County Council could appeal in this case, but that could be very expensive.) Unless the severe deterrents to judicial review of the legality of planning decisions are reduced, large companies will continue indefinitely to bulldoze their way through the public interest.

RTZ's present applications are only the first of many. If they are rejected, they will be renewed in different terms with increasingly persuasive arguments. If they are accepted, they will open the floodgates. Even if the ores turn out to be poor, the same ores will someday be thought rich. In any event, only a nation sufficiently aroused to strengthen the existing National Park legislation, and sufficiently vigilant to guard it from evasion day by day, can ever keep large-scale mining out of the Parks.

Under present law, a Minister can authorise almost any sort of heavy industry he likes in a National Park without seeking Parliament's consent. The purposes for which the Parks have been reserved seem in law to give rise to no enforceable public rights to enjoy the Parks unimpaired. To make a Park last only until a Minister decides he has a better use for it is in practice to abandon the idea of National Parks held in trust by the will of Parliament.

You pays your money . . .

National Parks and the mining industry cannot both flourish forever in Britain, so Britain must decide which she prefers. If her National Parks are to have a price, RTZ and its competitors have the money and will bid more and more temptingly. Yet some things of value have no price; and if everything has a price, we can keep nothing priceless.

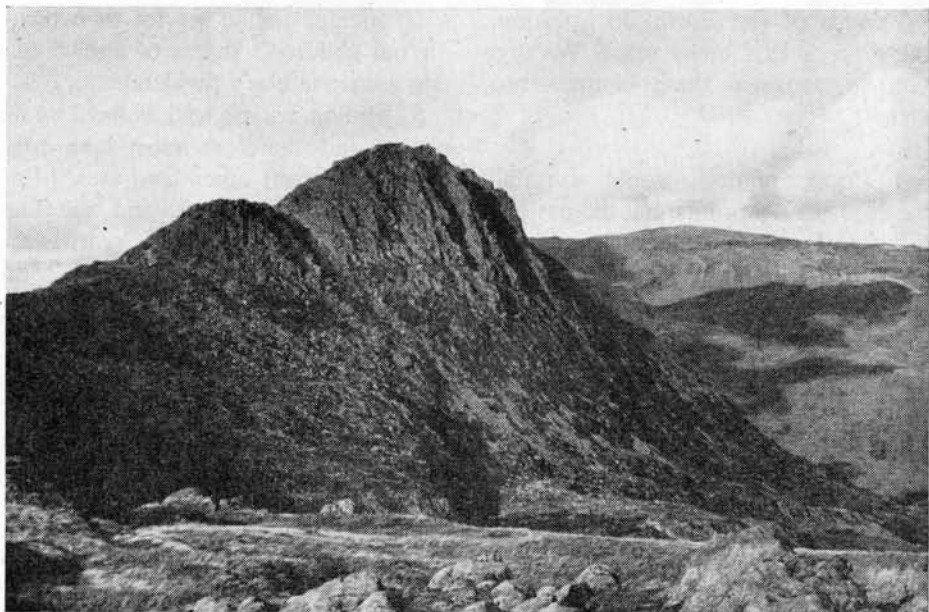
The main arguments for mineral extraction in Snowdonia are:

1. Copper-mining is essential in the national interest.
2. Copper is a strategic metal; therefore mining it would increase national security.



Ogwen Valley

Tryfan from Bwlch Caseg Fraith



Cader Idris



3. Copper-mining would make Britain more self-sufficient—less dependent on distant and unstable sources.

4. Copper-mining would make Britain more prosperous by reducing her sterling outflow for foreign copper.

5. The Mawddach is Britain's only known potential source of substantial amounts of gold; therefore we must use our unique opportunity to get the gold.

6. Mineral extraction would bring hundreds of badly-needed jobs to Merioneth.

7. In obtaining all these benefits, we would not lose the "amenity" of the Park—indeed, the Park would actually be improved.

8. Mining is essential in the name of progress and inevitable in a world that depends on progress.

Friends of the Earth do not think these arguments make sense. We urge you to consider these counter-arguments:

1. Copper-mining would certainly increase RTZ's profits, but the national interest does not necessarily coincide with RTZ's interest. By no stretch of a highly elastic imagination can copper-mining be said to be essential for Britain; we suspect that if the copper were not there we should get on very well without it. The national interest in Snowdonia seems to have been expressed by Parliament, which reserved the land "for the purpose of preserving and enhancing [its] natural beauty . . . and . . . of promoting [its] enjoyment by the public". The interest of the millions of visitors who come to Snowdonia each year (we shall refer in a moment to the interests of the residents, who have even more of a claim on how their land is used) is in enjoying beauty and wildness close to the cities. This interest would not be furthered by mining. If Parliament, which is supposed to know what is in the national interest, no longer means what it said in 1949 and in the Countryside Act, 1968, it is odd that Parliament has not said so.

2. If copper is a strategic metal—one essential to have reserves of in an emergency—we should be foolish to squander it in peacetime.

3. Again, depleting our reserves can only reduce our self-sufficiency. The other countries that rely on the same sources of copper we do are not so anxious about their copper-supplies, for

their sources are very stable and will be for a long time. RTZ and other companies have large copper-mines in South Africa, Canada, and New Guinea: Chile and Zambia are not the only sources. Indeed, RTZ's foreign mines are so successful that far from failing to avert a critical world shortage of copper, they have recently helped to produce a glut on the market.

4. Even after part of RTZ's profit has returned abroad (as dividends and investments) Britain would save sterling by mining copper domestically. This is the best argument we know for mining in Snowdonia, but we do not think it is good enough. Britain could reduce her copper-importing in other ways too—for example, if RTZ applied some of its capital and expertise to recycling copper. (Scrap brass is a much better ore than Welsh rock.) That would be a far greater public service than turning our children's shares of Snowdonia into someone else's dividends.

5. Mining, we are told, is fixed by its nature and therefore must take precedence over all other land-uses. Mineral deposits, dam-sites, and the like are often represented as scarce resources that "must" be used. We do not see the logic of this argument—from uniqueness. Many things, such as polar bears, are not found in Britain, but that is not a reason for introducing them. There are many activities that cannot be carried out just anywhere—the leveling of mountains by nuclear explosions, for example, can be done only in mountainous country—but that is no argument for allowing them.

6. The boom-and-bust jobs brought to Merioneth by highly mechanised mining would be too temporary to interest school-leavers, few compared to the capital outlay, useless to the hard core of unemployment (men disabled by industrial disease and injury), and too skilled to be filled locally. For these reasons, two recent construction projects in Gwynedd—the Trawsfynydd nuclear power station and the large RTZ alumina-smelter on Anglesey—have failed to provide jobs as promised. The unemployment rate in Anglesey, for example, is the same after the smelter-building as before. RTZ's geologist at the Dolgellau inquiry said he had had trouble finding locally even six labourers to help with a seismic survey: the reasons for this would apply all the more to a modern mining operation needing highly skilled machine-experts.

All economists who have seriously studied Merioneth's unemployment agree that although it must be relieved promptly, heavy extractive industry is not the way to relieve it, and would probably leave the area worse off than before. We feel that the bait of jobs has been seized far too uncritically, especially by local MPs who should know better. We believe that if the people of Merioneth realised the scale and the side-effects of modern opencast mining, they would be less anxious to bestow on Dolgellau the same benefits that quarrying brought to Llanberis.

7. Large-scale mineral extraction in Merioneth would cause drastic and irreparable harm to the beauty and wildness of the land—qualities that tourists now pay more than £5 million a year (£400 per Merioneth family) to enjoy. This income is permanent, depends on an inexhaustible resource, could be greatly increased, and benefits everyone in the community. We do not think it makes sense to jeopardise this stable, widespread, long-term income in order to seek a speculative, undispersed, short-term income. RTZ has pointed out how its working could be "cosmeticised"—e.g. by flooding an opencast pit to make a new recreational lake (which we doubt anything could live in) or pumped power-storage station (which we would hardly prefer to a forest), or by hiding the pit behind artificial mountains of tailings (which probably could not be revegetated). We realise that RTZ thinks such "cosmeticisation" would be real conservation, but we do not think that is what National Parks are for.

8. We do not think that large-scale mineral extraction in one of our finest National Parks has anything to do with progress. We think it is a clever, well-financed, disastrously misguided attempt to destroy for profit the values National Parks are designed to preserve. RTZ thinks mining in Snowdonia would be a patriotic public service; we do not agree. Mining treats the earth as though we had a spare. It literally costs the earth. Yet mining is not inevitable unless we fail in our civic duties: all citizens have a choice, for themselves and their descendants. Friends of the Earth urge you to help your Government make the right one. As Newton Drury might have said, Britain is neither rich enough to be able to afford to sell Snowdonia, nor poor enough to need to.

Aluminium and Anglesey

by

Richard Thompson Coon

In 1955 an enormous bauxite deposit was discovered at Weipa, near the tip of the Cape York Peninsula, Queensland. The deposit contains more than 2,000 million tons of bauxite, or about 20 per cent of the world's known reserves. Discovery led to the formation of the Commonwealth Aluminium Corporation (Comalco), in which Conzinc Riotinto of Australia Ltd. (CRA) have a 45 per cent shareholding. CRA is owned 83.6 per cent by the Rio Tinto-Zinc Corporation.

In 1960, CRA and Kaiser formed Comalco Industries Pty Ltd as the management and marketing company for the Comalco group, and in so doing established the base from which the RTZ Group's expanding aluminium interests could grow. Comalco has become one of the world's leading producers of bauxite with production capacity expected to reach 10.5 million tons in 1972.

The largest outlet for the Weipa bauxite is Comalco's alumina refinery at Gladstone, also in Queensland; it is presently the largest alumina refinery in the world and by 1972 will have a rated capacity of 2 million tons per annum.

At the present rate of consumption and loss the bauxite reserve at Weipa could be exhausted in less than 35 years.

During the last Labour administration, RTZ, requiring an outlet for their alumina from Gladstone, approached the Government on the question of establishing a primary aluminium smelting plant in Britain.

Electricity accounts for about 15 per cent of total smelting costs, and consequently Britain, because of the relatively high cost of electricity, has relied on importing aluminium, mostly ingot, from countries such as Canada and

Norway where hydro-electric power is cheap. It was therefore essential for any company contemplating large-scale aluminium smelting operations to negotiate a cheap source of electricity. RTZ made the first move, but were quickly followed by British Aluminium and Alcan. Combined their plans meant an introduction into this country of a smelting capacity of about 320,000 tons per annum, which it was originally estimated would save the country £40 million on imports. After a lot of argument, the British taxpayer was eventually made to contribute £62 million to the smelter projects under the Industrial Expansion Act. RTZ received a loan of £33 million, which was used as a capital payment to the CEBG in return for cheap nuclear power.

What follows is the brief story of how the Rio Tinto-Zinc Corporation landed on Anglesey; how it built an aluminium smelter and how it is degrading the life of the surrounding district. The decision to build the

smelter on Anglesey was made long before the people who lived there knew anything about it, whilst the Public Enquiry that was eventually held was predictably a democratic farce.

The Wylfa power station

In 1957 test drilling was begun on the Weipa bauxite deposits in Queensland. In 1959 Leslie Watson joined RTZ's precursor, Consolidated Zinc, from South Africa, and took on the task of preparing plans for an aluminium smelter in Britain. In 1963 construction began on the Wylfa nuclear power station only a few miles to the north of Holyhead. It is likely that Wylfa was considered as a power source, but as we now know, RTZ paid their £33 million government subsidy to the CEBG as a capital contribution to the Dungeness "B" nuclear power station, and obtained in return electricity from the grid, under a 20-25 year contract, at a price related to the cost of producing power at the Dungeness "B" station.

By 1964 detailed plans had been prepared, whilst the people on Anglesey still had no idea of their existence. The plans proposed the immediate construction, at Penrhos, Holyhead, of a smelter with an initial capacity of 120,000 tons pa, as well as extensive modifications to Holyhead harbour. A later phase

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was planned, to increase capacity to 300,000 tons with the possibility of further development of a bauxite refinery. No mention of these plans was made in their 1966 Annual Report.

In the Autumn of 1966, RTZ started to purchase the land around Penrhos, and rumours began to spread. The Clerks of both the Holyhead UDC and the County Council professed ignorance of what was going on.

By the Summer of 1967, RTZ had held several confidential meetings with senior members of the Anglesey County Council (ACC), but there was still no official statement of intention. In June, the TGWU in North West Wales pledged its support to the County Council in their bid to attract the industry to the Island.

With Wylfa nearing completion, hundreds of men were soon to be laid off work. Most of the construction force had been imported, but many, having settled into the local community, were now presenting local authorities with an abnormally inflated unemployment problem for which one immediate solution would be the RTZ plant.

In July the local papers were still including headlines like "Rio rumours still. Let Facts Be Told".

The Anglesey Residents' Association

General anxiety had been engendered by the refusal of senior members of the County Council to let the public know precisely what it was that was coming to Anglesey. This led to the formation of the Anglesey Residents' Association (ARA). People began to realise that aluminium smelting released large quantities of hydrogen fluoride gas into the atmosphere. Anglesey's Medical Officer of Health (MOH) was also aware of the possible dangers and felt that he was being purposely excluded from meetings that, under the circumstances, he should have attended.

He was eventually officially informed about the project on the eve of his departure to West Virginia, where, with other ACC officials, on a trip paid for by RTZ, he had been invited to inspect a large smelter operated by Kaiser. The report he produced upon his return, concluded that Anglesey *must* obtain assurances from RTZ on the control of fluoride emissions, because 'if we do not, we could well be caught in an avalanche with no return to the status quo'.

The aluminium smelting process consists of the electrolytic reduction of alumina (Al_2O_3) dissolved in a bath of molten fluorides at $950^\circ C$. It is technically possible to scrub both the low-level emission of gases from the pot rooms and the high-level emission from the main stack to an efficiency of 95 per cent; however, because of the type of cell or pot chosen for use in the Anglesey smelter (using "pre-baked" anodes), efficient extraction is made more difficult.

Fluorine contamination from atmospheric fallout can cause severe damage to most forms of life; it is cumulative and therefore the degree of damage is dependent upon the length of exposure to the contaminant, as well as its concentration. For these reasons the MRC Memorandum No. 22 on Industrial Fluorosis concludes that "... it is only prudent to site new developments in such a way that, so far as is possible, residents are kept out of the zone known to be liable to contamination". Animal husbandry is usually impossible in the locality of an aluminium smelter. Presumably RTZ ignored these facts when they made their plans, for the smelter stands contiguous with Holyhead town; primary schools are only a few hundred yards away and 16,000 people live well within the fallout area.

As the facts became known the row began to flare. The TGWU spoke out strongly for the smelter for obvious reasons, but also because they hoped to improve their bargaining power with the existing main employer, British Rail. Amiable RTZ representatives mingled with the locals in clubs and hotel bars, speaking seductively of the benefits to come.

First planning application

On 4 October RTZ made their first official outline planning application to the ACC. The proposed site had a total area of 738 acres with 463 acres to be used for industrial purposes and 275 acres to be used as an Amenity Area; the meaning of amenity in this context is obscure.

Later on in October an exceedingly small notice appeared in the local paper announcing the application, and on 20 October RTZ executives met with local councillors to display a scenic model of the site and distribute their propaganda booklet "Aluminium Project for Anglesey". The booklet stated that "A well-designed modern alumin-

ium plant does not emit smells or fumes and effluents which could cause harm." It also asked local authorities to consider the ultimate development of an alumina refinery on the same site.

There then followed a series of local council meetings and a full ACC meeting was called on 14 November to debate the application. An eye-witness account of this meeting reads as follows: "There, facing the ranks of Welsh councillors, sat, rather nervously, the representatives of RTZ. The debate was opened: one ancient, his bald pate fringed by flowing white locks, struggled on for a few sentences in English, then appealed to the Chairman—could he not use his mother-tongue? Assent was given, and the Bardic arms were raised to Heaven, the powerful Welsh phrases rolled round the Council chamber like thunder. RTZ looked dumbfounded. He was followed by others, equally passionate: should they sell their birthright for a mess of pottage? A decision was taken to delay voting for one month and seek expert opinion from university sources. What after all was all this bum's rush asked one councillor? As the vote was taken, the Clerk to the ACC threw down his pen in an angry gesture."

One month wasn't very long. A delegation from the National Farmers Union visited aluminium smelters in Switzerland and Germany and realised that damage to milk and fatstock would be inevitable. Professors in Botany, Zoology and Marine Biology at the local University College were consulted and all reported unfavourably. The Professor of Chemical Engineering at University College, Swansea, was retained by the ACC as a consultant and his report recommended that no objection on grounds of atmospheric contamination be raised, *provided* that certain conditions were met; these he listed.

While everybody was gathering data to support their particular point of view, the Clerk to the ACC was conducting his own campaign; the next major meeting was planned for 14 December and during the days preceding it he summoned, individually, every member of the County Council to his office for a "chat". On the morning of 14 December there was a meeting of the planning committee with full powers to approve schemes for industrial development. RTZ's plans were debated, and the meeting voted 10:10

for and against. The chairman then used his casting vote to make it 11:10 for RTZ, but subsequently withdrew and the decision was deferred. The full Council meeting that afternoon, was to all intents and purposes completely biased and anybody wishing to object had to force their way into the debate.

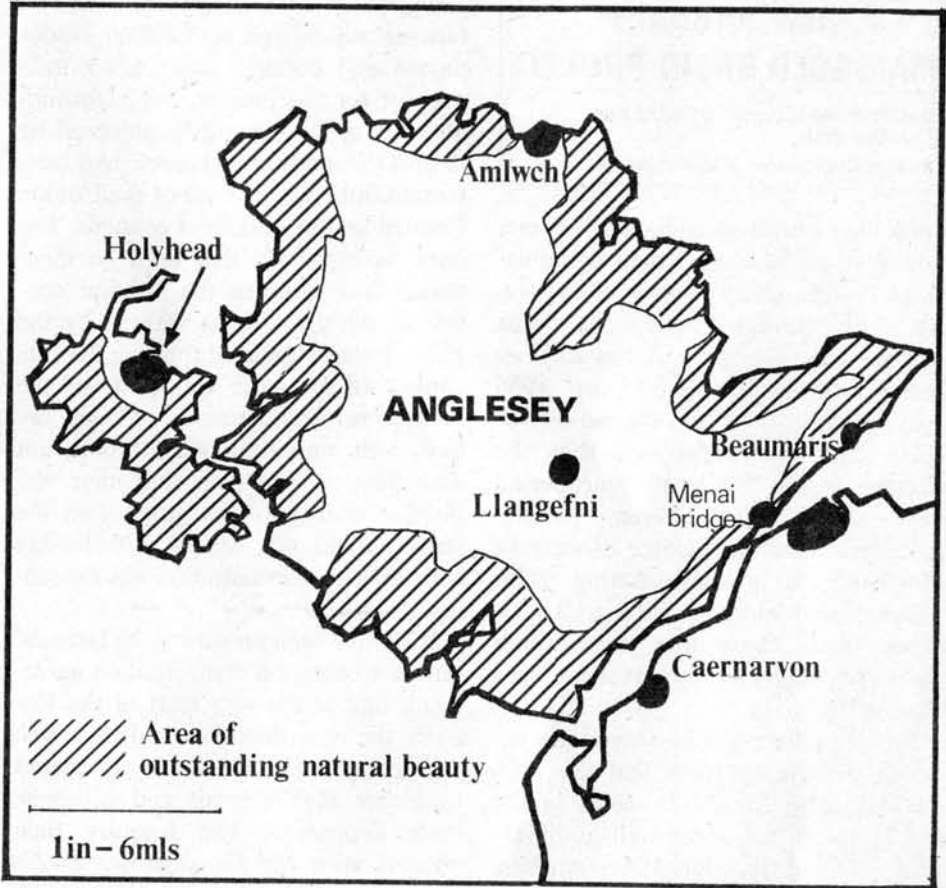
Over 170 written objections

It must have been clear to the Clerk and the Chairman that it would have been unwise to try and force a decision there and then; over 170 written objections had been received and these included the National Farmers Union, the Farmers Union of Wales, the Ministry of Agriculture, Fisheries and Food (Caernarvon), the Marine Science Laboratories, Menai Bridge UDC, and the Anglesey Residents' Association. Accordingly, the matter was put before the Secretary of State for Wales and a Public Enquiry was called, to begin on 9 January 1968.

RTZ had realised that their plan to construct a bauxite to alumina refinery was temporarily becoming a thorn in their side and so a letter from Leslie Watson was sent to the ACC stating that RTZ wished to put on record that: "(1) We have no plan or intention to establish such a plant."; however, item (3) of the same letter, read "We have no intention of raising the matter again and would certainly not wish to do so as long as it was apparent that such a plant would not be welcomed by the people of Anglesey", from which we may conclude that they have every intention of doing so, when the time is ripe.

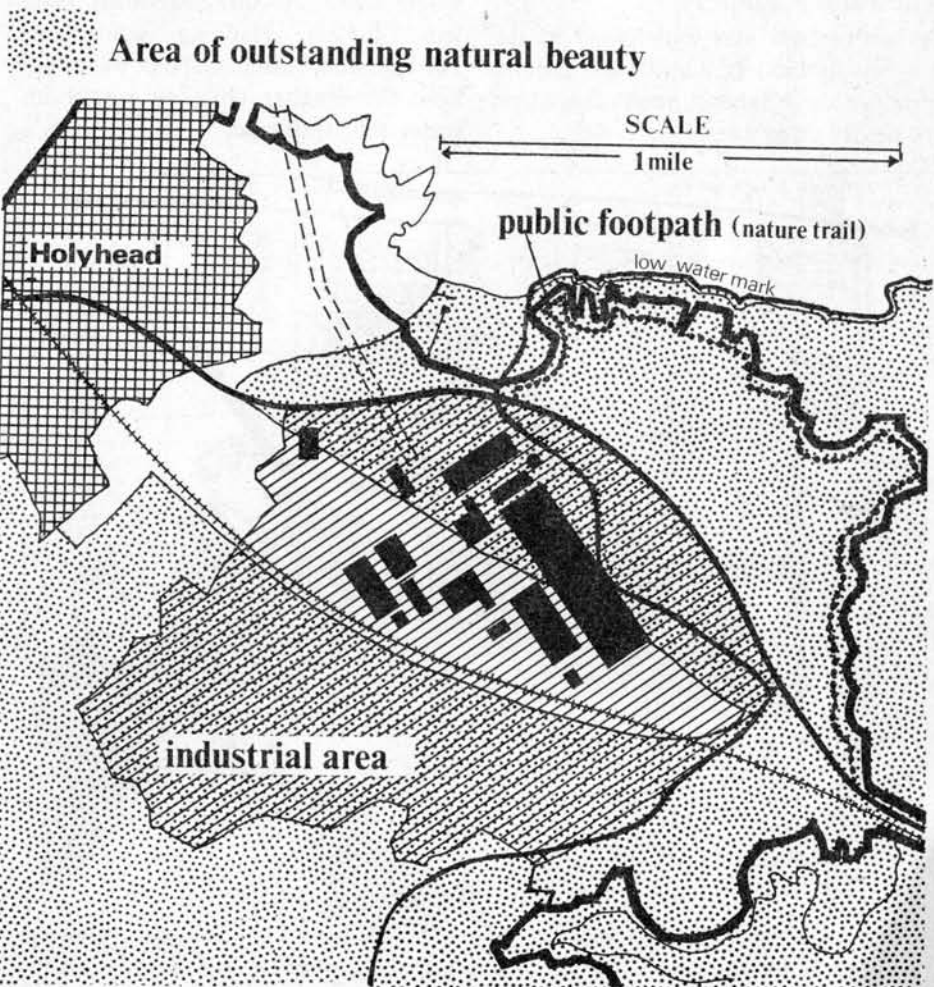
Early in December 1967, on the television programme "Week In, Week Out", Leslie Watson stated that an agreement had been reached between the Farmers Union of Wales and RTZ, regarding compensation for the loss of livestock due to fluoride emission from the proposed plant. In fact no such agreement had been reached, because there hadn't been any negotiations. Leslie Watson's motives for saying what he said are unimportant; however, the FUW were amused that on the one hand they were being asked to approve a project on the basis that it would have no detrimental effect on Man or beast, whilst on the other hand they were being hustled into accepting compensation for the very damage they were being assured could not occur.

It was then discovered that RTZ's



Sketch map of Anglesey

Sketch map showing aluminium reduction plant and surrounding area



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consulting chemical engineers, Cremer and Warner, had based their computations for the mean gaseous concentration of fluoride over the area surrounding the proposed plant, on meteorological conditions for 1966 only. Investigations into the validity of these calculations revealed that the average figures for a 10 year period gave a radically different picture. Localised pollution, i.e. that concerning Holyhead, is greatest during calm weather, and winds in the 1 to 3 knot range occur more than three times more frequently in an average year than in 1966.

Similar differences in magnitude between the average data and the 1966 data are also found for winds in the higher speed ranges, as well as differences in wind direction. It is disturbing that their resulting figures and maps were used as evidence in support of RTZ at the Public Enquiry.

The Public Enquiry

A battle royal was anticipated at the Enquiry and indeed a battle was fought. It began on 9 January and dragged on for nearly three weeks.

Opposing RTZ were ARA, the two farmers' unions and the CPRW. Trades unions and councils had stated their support for the project, but a formidable list of "safeguards", prepared by the MOH and other advisors, had been written into the approval of the County Council and local district councils. The only "safeguards" that need be mentioned here concern the fluorine content of the gases to be emitted by the plant. It was stipulated that the fluorine content of the gases emitted from the pot rooms should not exceed 360 lb/day with fluorine concentration not exceeding 0.5 mg/m³ and that the fluorine content of the gases from the stack should not exceed 330 lb/day with fluorine concentration not exceeding 2.5 mg/m³.

RTZ had been pressuring the farmers' unions to accept a compensation agreement, and at the very start of the Enquiry the opposition suffered their first disappointment when the NFU agreed to accept RTZ's terms and withdrew their opposition. The Enquiry then opened with Mr Goodfellow, RTZ's Counsel, delivering a long exposition on the national necessity of the plant, on how it would staunch the outflow of Anglesey's young people, and how it would solve the unemployment problem. RTZ's Planning consultants, Davidge and Partners, spoke warmly of how the smelter chimney would improve the landscape.

The County Council's recommendation that the low-level emission of gases from the pot rooms should be scrubbed, was firmly squashed. It was "impracticable", and in any case the Company itself proposed to farm the area close to the smelter. One by one, as the Enquiry dragged on, the ACC "safeguards" fell by the wayside. RTZ stated that they would only need to emit 284 lb/day of fluorine, at 0.44 mg/m³, from the pot rooms, and only 270 lb/day of fluorine, at 2.2 mg/m³, from the stack. This had the effect, desired or not, of making the County Council and public begin to wonder what all the fuss was about. A letter from the Alkali Inspectorate was read, expressing deep satisfaction with the way in which RTZ were preparing to deal with the problem of controlling these effluents, and eventually the entire matter was left in the hands of the Inspectorate. RTZ had cleared their biggest hurdle.

On 24 January, at the close of the day's proceedings Goodfellow delivered an ultimatum to the FUW to accept his proposals for compensation by 10 am the next day, or any offer of compensation would be terminated. The FUW not only turned the offer down, but gave the Inspector a list of 428 objecting island farmers, 140 Anglesey NFU members, some of whom were on its executive. Mr Williams, Secretary to the FUW, said that he would not commit his members in advance to unknown hazards and continued "I have been given the option of either being shot or drowned and I have no desire to accept either". Dr Dobbs, a senior lecturer carrying out research in plant and forest pathology, with special interests in soil microbiology, spoke on behalf of the FUW. Dr Dobbs could not have been more qualified to speak on the subject. Yet the transcript covering the cross-examination of Dr Dobbs covers nearly 40 pages in which his opinions are almost continuously abused.

When the ARA tried to voice its objections it was beaten down, and the Council for the Protection of Rural Wales walked out of the Enquiry.

For all the good it did, the Enquiry might never have been held. The ARA appealed first to their MP, the Secretary of State for Wales, and then to the Parliamentary Commissioner. There was little point to either of these actions except that the Enquiry had been a sham and some gesture of disgust was



"Wouldn't it be cheaper to be a little bit more careful in the first place?"

necessary.

Overland cables brought power to the smelter from the grid at Wylfa, and Anglesey Aluminium Ltd. (75 per cent RTZ-BICC Aluminium Holdings Ltd) went into production on 9 December 1970.

Pollution increases

The Company are required to monitor the ground level concentration of fluorine in the locality of the smelter; however, the results are not available to the public or the district councils concerned; they are available to the Chief Alkali Inspector, the Ministry of Agriculture, Fisheries and Food, the Regional Officer for the Nature Conservancy and the local MOH. Quite by accident, in August 1969, it became public knowledge that the levels of pollution agreed at the Public Enquiry had been discarded and that the Alkali Inspectorate had permitted more than a threefold increase in the emission of gaseous fluoride from the stack.

The official reason for the increase seems to have been that, since the Enquiry, smelting capacity had been reduced from a maximum of 120,000 tons per annum to 100,000 tons, and the height of the stack had been increased from 300 feet to 400 feet. We must therefore presume that the figures for gaseous emission that were recommended as being safe at the Enquiry, are now regarded as obsolete by the Company and the Inspectorate. (The recommendations were based on data provided by RTZ and on a stack height of 525 feet). The attitude and failings of the Alkali Inspectorate are discussed elsewhere in this issue of *The Ecologist*.

Duncan Dewdney, Chairman of Anglesey Aluminium Ltd., and Executive Director of RTZ, was asked what he would do if the Company could not contain pollution at the new level, that is, a scrubbing efficiency of 86 per cent as against the previous 95 per cent. He replied that the Company would have to spend more on scrubbing equipment. Why then, he was asked, were the Company not prepared to install equipment that would maintain a scrubbing efficiency of 95 per cent as promised, particularly since the smelter had been constructed under its budgeted cost. It appears that the Company has no intention of either installing this equipment or of going back to the original figures.

The future for those who had no choice?

The smelter is presently working at about $\frac{1}{3}$ maximum capacity. Information is hard to come by, but reports have it that the fluoride extraction plant is giving trouble and has broken down twice. There are other reports of the paintwork on cars parked in the factory compound becoming pitted, and of their windscreens being etched.

That Rio Tinto-Zinc should be allowed to dictate the state of health of the surrounding district is irresponsible. All figures should be open to public inspection, and an independent monitoring service should be established.

The 275 acres of so-called Amenity Area that flattered local authorities in the early planning days is skirted by what is called a nature trail.

A booklet, put out by RTZ, reads "Welcome to Penrhos Nature Trail. The path you are about to follow is a new one laid down by Anglesey Aluminium Ltd and forms the course of a nature trail established by the Company in response to European Conservation Year", it adds "Please do not spoil it for others by leaving rubbish or damaging trees."

The unemployment situation on Anglesey is as bad as it ever was. In December 1967 there were 1,200 people unemployed, in January this year the figure was 1,344 and at the end of April it was 1,427 (9.7 per cent). Anglesey Aluminium has recently

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written to the County Council to say that they will be releasing large numbers of men over the next few months.

In 1967 the FUW wrote: "It is, in our view, an error to suppose that the sort of young people who might be attracted to the bright lights of a great city would be induced to remain by the urban attractions of an industrialised Holyhead, dominated by one large aluminium smelter."

With the level of permitted pollution now over three times that which was originally stipulated as "safe", and with RTZ intending to treble the capacity of the smelter, Anglesey has in fact become caught in an avalanche. It is yet too early to speak of damage to humans, animals and plants because of the cumulative nature of the fluoride ion; but the future of the people who had no choice is bleak.

The Rio Tinto-Zinc Corporation has lied, bullied, seduced and cajoled all who stood in their path.

As the hand of "Big Brother" descends, so the character, beauty, serenity and warmth of the island begins its inevitable decline.

May others be warned.

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No oil at Amlwch

by

Richard Thompson Coon

Demand for energy in the British Isles is presently increasing at a rate of between 7 and 8 per cent per year. This means that the capacity of our oil refineries must double every ten years if they are to meet demand. More and more oil will have to be extracted and transported with the inevitable result of increasing environmental deterioration.

The island of Anglesey is the smallest county in Wales, with an area of 276 sq miles and a coastal frontage of 125.5 miles. About 70 per cent of the coastline remains undeveloped (see Table 1). The story that follows is a thorough illustration of how our society continues to court ecological catastrophe. On its own it is but a small insult to the natural dignity of the world, but it is symptomatic of all that bedevils this technological era.

In September 1963 the Ministry of Housing and Local Government asked local planning authorities in North Wales to make a special study of their coastal areas and to write into their development plans a policy for safeguarding natural resources. In June 1965 the planning ministers again expressed deep concern about the spread of development on the coast.

Anglesey has a beautiful and unspoiled coastline, a fact which the

county council recognised when, in their report, they pressed that the area be designated an Area of Outstanding Natural Beauty (AONB). This they achieved, and at present all but a few miles of the Anglesey coastline stands as an AONB. For some reason, however, the 1967 White Paper "Wales: the Way Ahead" advocates the growth of industry in suitable places along the coast as the main means of strengthening the economy, singling out the North Coast and that of Anglesey. In January this year the Welsh Council published a report entitled "An Economic Strategy for North West Wales" which seconded the White Paper and paid cursory attention to agricultural development.

Anglesey's first major industry, however, came after a public enquiry in 1947, when the predecessor of Associated Octel Co. Ltd. established a bromine from sea water extraction plant on the north coast of Anglesey at Amlwch. They promised no pollution. Many oil companies including Shell hold shares; and in 1966 an extensive expansion of the works was undertaken. The air around Amlwch is now polluted with bitter acid gas, and a creamy yellowy effluent discolours the sea.

Next to come, after another public enquiry in 1963, was the Wylfa Nuclear Power Station at Cemaes Bay five miles west of Amlwch. The construction of the power station brought to the island the problem of how to deal with an enormous imported labour force, a problem which lingers on today. The landscaping of the power station has

been appalling and local authorities continue to complain about the mess, not to mention general unsightliness, pylons, radioactive wastes and the problems that will have to be faced in 25 years time.

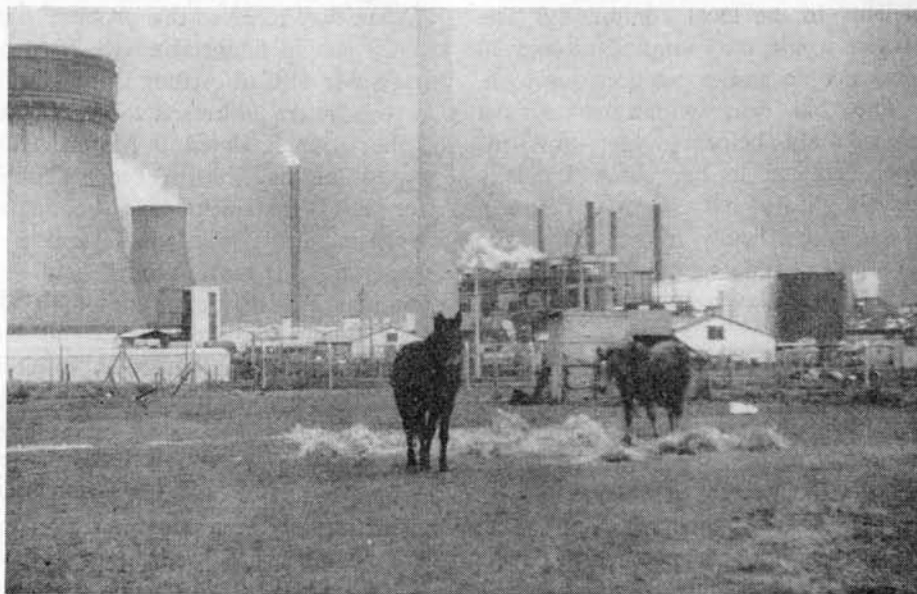
At yet another public enquiry in 1968, Rio Tinto-Zinc forced their way on to the island with their 100,000 tons a year aluminium smelter.

The decade of invasions

In less than a decade the big corporations have moved in on Anglesey; holding hands with central Government they have begun their slow, insidious dance around the islands, crushing and casting aside as they go. The islanders have become weary of objecting. Last year, after long and secretive planning, the Mersey Docks and Harbours Board and Shell (UK) Ltd. announced their intention to discharge 50,000,000 tons of oil a year from tankers on to the mainland at Amlwch. No consideration was given to the islanders in the proposals which met with 100 per cent local opposition.

In the Annual Report and Accounts, 1969, the Mersey Docks and Harbours Board reported total imports of petroleum in bulk at 11,156,000 tons. They also reported that "the oil refining companies in the area continue to expand their installations and will require a much greater output of crude oil in the near future".

Ellesmere Port must rank amongst the most intensively devastated environments in the British Isles. Gulf, Esso, ICI, Total, Burmah, Shell and others combine to create an environment that



Stanlow

has to be seen to be believed. They say locally that to retire from Shell is to die of fresh air. Shell have their largest crude oil refinery (11 million tons a year) at Stanlow Point; it is connected via 23 miles of pipelines to their petrochemical plant at Carrington near Manchester, and they are now engaged in an expansion of the refinery to bring its capacity up to 17 million tons a year. A new ethylene cracking plant is also under review for Carrington.

The MDHB derive a large proportion of their revenue from port dues levied on the oil companies vessels. At present Shell's terminal at Tranmere, just south of Birkenhead, is able to handle tankers of 200,000 tons deadweight; however, this seems to be the practical limit in Mersey waters, and other than this the MDHB is apparently unwilling to cater for tankers over 90,000 tons on full draught. Because of the revenue derived from tanker traffic it is obviously advantageous to the MDHB to expand the area of their jurisdiction to incorporate the expanding activities of the oil companies, and so the MDHB together with Shell set out to solve the problems of an expanding oil industry and the consequent problem of accommodating the very large tankers.

An early plan was to build an artificial island, carrying tanks, in the deeper waters of Liverpool Bay; however the plan was dropped, probably on the grounds of cost, or of it being an unacceptable hazard to navigation, or both. It would almost certainly have caused a great deal of pollution.

Unknown to the people of Anglesey,

a further plan emerged to discharge oil off the north coast of Anglesey and pump it through about 75 miles of pipeline to Stanlow. The plan developed, and still unknown to the people of Anglesey, except one or two select members of the County Council, early survey work was begun.

In May 1969, a TV programme "Wales Today" broadcast the exclusive announcement that an oil company was arranging to take out options at a place called Rhosgoch on land to build a tank farm. In an area of unspoiled natural beauty the word oil instills dread and local people speculated on where the oil was to come from and to where it would go. In September, a chance radio conversation by an amateur operator on Anglesey with one in America revealed plans published in an American Shell house magazine to build a deep water oil terminal off Amlwch, a tank farm at Rhosgoch, about three miles inland, and a pipeline across the North Wales coast to Stanlow on Merseyside. A public meeting was organised at once, and 5 December saw the formation of the Amlwch and District Residents Association to whom the Anglesey Residents Association pledged their aid in opposition to the oil project. Shell had to come out into the open, and they met local authorities and residents' associations on 16 December. The press were excluded on request by Shell.

No oil at Amlwch

The consternation amongst local people was great and there followed much discussion and fact finding. When it was realised that Shell were to make a

formal announcement of their plans on 23 January 1970, another rushed meeting was called inviting Shell and all other interested parties to attend.

On 1 March a campaign was launched by local people to raise funds to fight Shell and to organise petitioning. NO OIL AT AMLWCH posters were printed and in August 1970 an Anti-Oil Campaign was launched as the direct spearhead representing the whole North Wales Coast.

Opposition organisation gained in efficiency and at a delegates meeting of the Campaign on 13 November, it was emphasised that there were two processes involved in establishing the terminal. First, that a Private Bill would have to be put before Parliament regarding the offshore installations and secondly, that a planning application would have to be put to the County Council for developments on the Island's mainland. On 21 November a delegation of the Anti-Oil Terminal Campaign met their local MP, Cledwyn Hughes, and put their case. He apparently "listened most attentively and took notes".

On 27 November last year it was announced in the local paper that a Private Bill entitled "Mersey Docks and Harbours Board (Anglesey Terminal)" was to be presented to Parliament and that it would be available for public inspection at the price of 2/- on 4 December. The bill was "To empower the MDHB to acquire lands (under the Compulsory Purchase Act 1965) and to construct works; and for other purposes". The MDHB was to exercise total jurisdiction with no

benefits to the local community. The project would only employ around 20 local people and opposition was total.

The bill was withdrawn almost immediately, before in fact any petitions against it had been officially lodged. Story has it that Cledwyn Hughes specifically asked that it be withdrawn, and the official reason for its withdrawal was published as local opposition.

At a meeting of the 16 Welsh MP's in Cardiff, a Welsh banker offered to lend the Anglesey County Council the necessary monies to embark upon the project themselves; it seems he was beaten to it by Shell who decided to finance the whole scheme whilst paying a direct levy to the County Council, based on the tonnage of oil landed, in an attempt to placate the local population. Shell require, however, that the Anglesey County Council pay for the necessary modifications to the harbour at Amlwch, a sum not exceeding £1 million, and are prepared to deduct the interest incurred from the revenue the council would otherwise receive from the oil.

When they received this proposal the council sought financial advice from a certain Mr Hill of Arthur Collins and Co. In a letter addressed to the Clerk of the Council, dated 9 March, Hill advised the council to accept Shell's offer. His letter included a seemingly superficial analysis of the proposal. Superficial on most points, and in particular in his estimate that the cost of developing the harbour would be between half a million to a million pounds! Taking the higher estimate the County Council can expect an average annual income of about £100,000 over the first decade of operations with that income steadily increasing thereafter to a maximum of a little more than £300,000 when the terminal is working at maximum capacity at an unspecified date after 1990.

In other words the County Council is presently in the process of being "bought out" by a deal proposed by Shell, which, on thorough analysis, will leave Anglesey with the eventual possibility of a few thousand pounds cash, liability for an extensive harbour and the threat of a reduction in its tourist

trade, an enormous tank farm, pumping stations, chimney stacks, pipelines, as well as the certainty of environmental pollution from oil. It is also clear that those on the council who are enthusiastic about this deal do not realise the full long-term consequences of their actions.

Installations will dominate landscape

At the time of writing (April) detailed plans are being prepared by the Parliamentary Agents in London; however, a rough description of the project is given below.

Marine Installations

Two 50 single mooring buoys (SBM's) each to be moored by eight 15 ton anchors at distances of approximately 2,000 yards and 3,000 yards off-shore. Each buoy to be connected to a shore pumping station by four submarine pipelines buried in seabeds. Pipeline system to each SBM consisting of two pairs of pipes, each pair making a closed flushing circuit; main pair of 48 in diameter for crude oils; small pair 24 in diameter to take fueling oils for tankers.

Amlwch port to be extended by breakwaters to protect, in an all-tide harbour, two 75 ft all-weather, 300/500 HP Berthing Launches.

SBM's have never been used in this country and are designed to take the Very Large Crude Carriers (VLCC's), presently around 200,000 tons, and eventually much bigger tankers.

The terminal is said to be able to handle around 50 million tons of oil a year, which is as much as the amount handled by all the refineries and terminals at Milford Haven at the moment.

Land Installations

A pumping station to boost the oil from tanker to tank farm will be sited on land owned by Associated Ocel and will comprise, besides tanks, pump houses and a 60 ft chimney stack. The "tank farm" will be sited on farm land at Rhosgoch and besides enormous tanks, will also include pump houses and a 60 ft chimney stack. Details of the tanks for both the proposed land installations are given in table 2.

The cross-country pipeline is a single 40 in pipe, buried 3 ft underground. Apparently no auxiliary pumping stations are planned.

Table 1

Approximate Length and % of Coastline for Main Uses (1966)

Main Use	miles	%
Agriculture and rough grazing	63	50.4
Settlement areas	23	18.4
Service establishments	4	3.2
Industries	2	1.6
Forestry	6	4.8
Nature Reserves and Sites of Special Scientific Interest	22	17.6
Holiday camping and caravanning	3	2.4
Commons	2	1.6
Total	125	100.0

Table 2

Site		Capacity Mtr ³	No.	Diameter mtrs.	Height		Purpose
					Feet (approx)	mtrs.	
Shore Pumping Station	First Phase	30,000	2	46.5	61	18.5	Holding
		5,000	2	27.5	31	9.25	Holding
		5,000	1	27.5	31	9.25	"Surge tank"
Tank Farm	First Phase	100,000	8	78	73	22	Storage
		50,000	6	33	56	17	Storage
	Second Phase	100,000	8	78	73	22	Storage

As Shell took over the complete project early this year, their PR men moved into both the areas directly concerned and those outside areas which feared pollution. Films were shown to local councils, hoteliers and residents' associations all along the North Wales coast. Special meetings were held with local councils and, in some quarters, resistance began to weaken.

Shell are insisting that all craft using the proposed harbour, including pleasure boats, should pay proper dues, and Hill suggests that these could be levied in such a way as to cover the estimated £25,000 needed to run the harbour. At present Amlwch Harbour is small and beautiful, providing enjoyment for the Amlwch Port Boat Club and many others besides; and there are no harbour dues.

Then on 18 March there was a debate at the AGM of the Anglesey County Council on a motion proposing that the County Council itself present a Private Bill in Parliament this 1970-1971 Session to obtain permission to commence construction of the offshore installations. No planning applications had been received from Shell and people were stunned by the unprecedented haste on such an important issue. Local opinion was also surprised that the County Council should present the Bill and not Shell, and could only conclude that it was to the advantage of Shell to get the County Council to do it for them.

The decision not to wait for a formal planning application infuriated those local people who were aware of the implications of Shell's plans. Objections to the motion were received from, amongst others, the Farmers Union of Wales, the Menai Bridge UDC, the Amlwch Port Boat Club, the Anglesey Residents Associations, the CPRW, the RSPCA, and the Amlwch Chamber of Commerce. Seven thousand signatures in opposition to the motion were collected by the Amlwch and Districts Residents Association alone. All objectors asked that they might first be allowed to debate the plans when they were received and that any decisions on the matter be withheld until this had been done.

At the AGM, Alun Williams, a solicitor, presented his motion with soft persuasiveness: "Bold brave and venturesome as we might be..." and "our chance to be pioneers in another field of public interest..." are typical

phrases. Mr Hill spoke next and the commercial naivety of "The levy and loan fees offered to you by Shell are a recognition of Anglesey's natural geographic position", was matched by the odd combination of despair and threat in "You will get an oil terminal in any case and so you might as well present the Bill now, or else you won't get anything".

For some reason the Planning Officer was not called on to comment. Alun Williams was accused of blackmail and of rigging the whole meeting, but despite all he won. His motion was carried 44 votes for and 11 against.

Within a few days of this meeting a planning application had been received from Shell in connection with the Tank Farm and other land installations, and the local district council directly concerned has been informed by the County Council that they have no planning grounds on which to oppose this application. Shell had already purchased the land for the tank farm and are currently paying the farmers through whose land the pipeline will go the sum of 90p a yard, together with a modest handshake of £5.

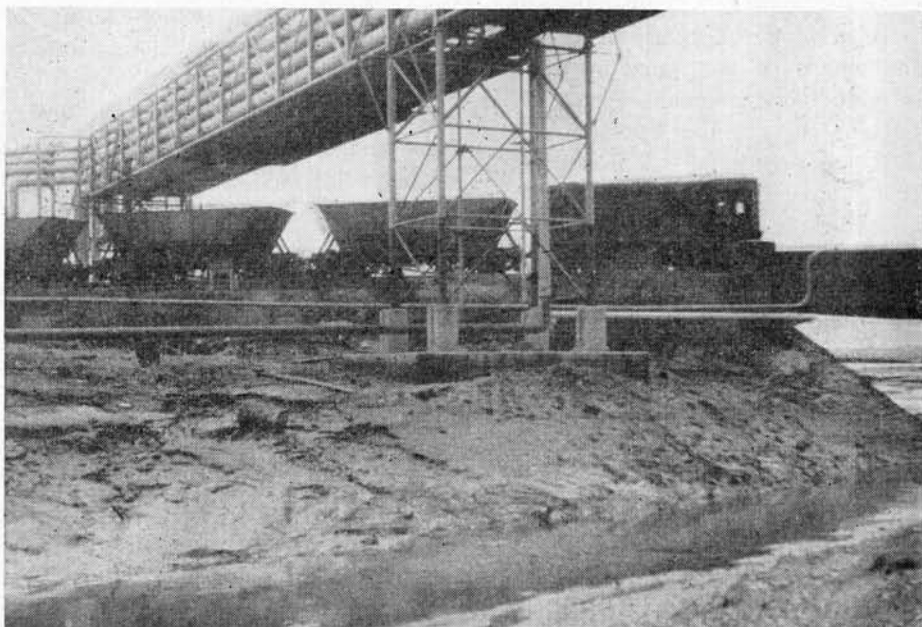
Assuming that it is the duty of the County Council to consider the wishes of the people within its boundaries the most vital question that should have been asked, but wasn't, was whether local people would have preferred to pay £200,000 less rates or go without the terminal.

By the time this article is published the Bill will probably have had its second reading. It is generally considered that an amendment will be made at the second reading debate to give the MDHB some form of jurisdiction over the area concerned. This would probably be welcomed by Shell since they would be absolved of certain responsibilities; it would also be welcomed by the Liverpool Pilots Association who regard the terminal as an obstruction to shipping.

The threat of pollution is of course very grave, although I was assured that all precautions are being taken, that the most modern and effective oil dispersal equipment will be used, that the crews of the Berthing Launches will be fully trained, and that the tankers themselves carry spray lances. We know however, that there is no effective method of clearing oil at sea. Indeed Shell is working in the "hope" that they will have devised an effective method by 1974 when the terminal is due to go into operation; but whatever they devise it is unlikely that there will ever be any really efficient method of clearing oil in 4, 5 or 6 foot waves with a fast-flowing current.

We are told that Shell invented the SBM's, that Shell is now operating 17 of them, that the original one has now been in operation for 10 years, and that there has been only one spill of 15 tons in all that time off Kuala Lumpur. We

The river Gowy passing through Stanlow



are shown colour film of oil transfer to and from an SBM. If we are lucky we might also get to see a film entitled "Murex and Darina". Murex, a VLCC, is Shell's flagship, whilst Darina is a smaller, specialised "lightering tanker". The film shows efficient ship-to-ship oil transfer on the high seas; in the last two years Anglesey has started to experience this sort of efficiency as oil begins to appear around the island on beaches that were previously oil-free. This is because VLCC's bringing oil to Merseyside are having to lighten their loads by about 70,000 tons in the Irish Sea and off the North coast of Anglesey. The amount of oil appearing on beaches in recent years has led local sailors to judge these operations as haphazard. Three days before the time of writing a six mile oil slick was reported lying 12 miles north of Point Lynas on Anglesey.

Discharge of oil at an SBM by a VLCC, involves the tanker approaching the SBM to within 150 yards (under her own steam). We are told they will not approach in waves greater than seven feet. The tanker is moored by a berthing launch which also brings the floating hoses so that they can be craned up on to the tanker's deck.

The whole operation, which need not take more than 20 minutes would seem to be foolproof. Under the 1962 Pipelines Act however, any oil company, having first made necessary arrangements with Shell, may use the pipeline. The terminal, working at full capacity, will be able to handle six or seven times the volume of oil that Shell require to supply their extension to Stanlow, assuming continued use of existing terminals. So tankers flying many different flags will probably use the terminal, while many of the larger vessels are going to require refuelling, so smaller tankers will also be berthing at the SBM's to pump fuel oil ashore ready for refuelling the larger tankers.

The whole situation necessarily involves a concentration of tanker movements off the North Anglesey coast. Again, on the day of writing, oil pollution has been reported in the Menai Straits as the result of a small tanker flushing its tanks actually in the Straits, smearing yachts and plastering oil on the walls of Port Penrhyn.

There can be no doubt, that if Shell go ahead with their plans, Anglesey can expect a slow decline in the quality of its coastal environment, quite apart

from the catastrophic effects resulting from a collision.

Shell state that the SBM's will be outside the main shipping lanes for ships travelling to and from Liverpool; however, the shipping lanes are only recommended lanes, ostensibly about 5 miles off the north Anglesey coast. They are not strictly adhered to at present and collisions in the English Channel have taught us of the dangers associated with tanker movements in coastal waters.

On the 30 April 1969, the tanker "Hamilton Trader", on charter to Esso, collided with a German coaster near the Barlight vessel in Liverpool Bay. About 700 tons of heavy fuel oil were spilled into the sea; 4,407 seabirds are known to have died, although the actual mortality was probably two or three times greater than this.

The North Wales Coast is renowned for its bird life and in particular the breeding colonies of the Auk family—the Guillemots, Razor Bills, and Puffins at Great and Little Orme, Puffin Island and North and South Stack. As diving birds they are most vulnerable to oil pollution, their colonies are already known to be under pressure, (from rock climbers, etc.) and it is the considered opinion of scientists and ornithologists that if Shell go ahead with their plans we can expect to see a steady decline in the size of these colonies until the smaller ones cease to exist. Many other species will also be affected and there is considerable danger that the bird sanctuary at Cemlyn Bay which lies within one "tidal distance" of Amlwch will be threatened. The sanctuary may carry up to 2,000 ducks at any one time during the summer, whilst during the winter, 200-300 usually remain on the water.

Shell tell us that with fast flowing east-west tidal currents off Amlwch the chances of oil coming ashore on Anglesey are slight. This is strictly untrue. Strong winds frequently blow from the north west and with oil moving at 3-4 per cent of the wind speed there is a very great danger that the shores around Anglesey will become oiled. If oil originating from a tanker flying a foreign flag fouls somebody's foreshore hours after the ship has sailed, who if anybody is going to pay compensation to the party concerned?

On Anglesey the holiday trade ranks about third in terms of income to the

County. A survey carried out by the County Council jointly with the British Travel Association in 1964, found that people came on holiday to Anglesey to enjoy, first, its quietness and secondly, its coastal scenery; hardly surprising when the human chaos of the Lancashire industries is considered. More and more people flee to Anglesey every year to seek refreshment in clean air, clean water and clean land. Without crossing the Irish Sea they can go no further; it is easy to imagine the feeling of suffocation when they discover that here too there is no peace to be found.

Strong north-westerly winds will also bring oil, within a day or two, from Amlwch down into the Menai Straits where it will have serious effects on the mussel fisheries and cause severe setbacks to research programmes at the Marine Science Laboratories; by passing further east along the North Wales Coast it could well affect the shellfish hatcheries at Conway belonging to the Whitefish Authority and the Ministry of Agriculture.

Despite this and much other evidence besides, the onslaught of industrial expansionism still overrides the right of every individual to seek solace in the natural world. The Anglesey County Council is presently in the process of selling its most valuable resource, the pricelessness of its natural beauty, for a dubious and short-term reward. The changes that will ultimately result are largely irreversible. Once again we are taking away from those who come after us all choice of environment, all choice of what they will have to live with, and for what? More detergents, more insecticides, more artificial fertilisers, more plastic, more anti-knock compounds?

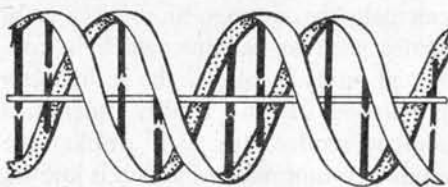
The days of the passive conservationist are over, because unless we are all mad, we must seek an alternative life to the one we now lead. The North Wales pipe-line is not such a small issue, it is a very great issue and with enough opposition it need never be built. The Bill will be debated in Parliament in early June. We plan a petition for the first week in June, so please write immediately either to *The Ecologist* or to "Friends of the Earth", 8 King Street, London WC2, indicating your opposition to the oil terminal so that we can add your name to the list. Although it is very short notice, it is well worth the effort.

Environmental genetic hazards—

the impossible problem

?

by
Bryn Bridges



Environmental pollution and its attendant hazards are newsworthy, and rightly so. The risk of genetic damage to man is one aspect, however, which has so far received less attention than it deserves, at least in the UK. One reason for this is that the possible end results are not immediately apparent.

They include both an increase in diseases with a strong hereditary component (e.g., mongolism, phenylketonuria, many anaemias) and an overall reduction in population fitness, not now, but in future generations. Even in the present generation the induction of malignant disease may not become apparent until decades after an exposure to an agent causing genetic damage (mutagen). Another reason, which it is the purpose of this article to explore, is the enormous number of difficulties which appear as soon as one tries to set practicable limits for exposure to mutagenic agents. Ionizing radiation is the only environmental mutagenic agent about which there are accepted international standards of exposure. Even here the estimates of risk are far from being uncontroversial, despite the availability of more information than we are ever likely to have for any other mutagen.

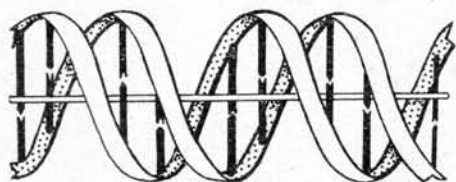
There are five stages at which decisions have to be made in the evaluation of the potential hazard from an environmental agent. Difficulties may arise at any stage, and taken together they may be almost insurmountable. The first question to be answered is "*Is the agent mutagenic?*" There is no single ideal experimental system for testing

mutagenicity, but a plethora of possible systems. The nearest practicable approach to the human system is probably the specific locus test in the mouse; breeding experiments with mice are the foundation of the present standards for radiation exposure. Such breeding experiments are, however, laborious, expensive and time consuming and it is unlikely that they could be considered for general screening. Their continued use is, however, absolutely essential for providing a baseline with which other tests may be compared and for decisions regarding controversial mutagens.

Perhaps the next most relevant test may be with cultured somatic cells from the Chinese hamster and man. It is only in the last two or three years that techniques have been developed for studying induced mutation in cultured cells. The work so far, in our own laboratory, and elsewhere, gives hope that they may respond in a similar manner to germ line cells. Other tests include breeding experiments with the fruit fly *Drosophila*, microscopic observation of visible chromosome aberrations in plants and cultured mammalian cells, and detection of presumed gross chromosomal abnormalities by looking at intra-uterine deaths of foetuses in female rodents treated before conception (dominant lethal test). The induction of mutations in bacteria or other micro-organisms is probably the cheapest and most immediately applicable approach for screening very large numbers of chemicals. One must, however, have some reservations about the relevance to man of the results obtained. A useful hybrid technique is the host-mediated assay which overcomes the objection that a compound may be harmless to cells by itself but be converted by the metabolism of the host to a potent mutagen. In this test the assay organ-

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isms, for example bacterial, fungal, or cultured mammalian cells, are injected into the body cavity of a rodent which has been treated with a suspected mutagen *via* another route (e.g., oral, respiratory, intravenous). After, say, one hour, the cells are extracted and tested for the possible induction of mutants.



By means of tests such as these it is usually relatively easy to say that an agent is mutagenic in a given test system. Some agents, for example ionizing and ultraviolet radiations, mustard gas, give positive results in all test systems. Others are only mutagenic in some, and these lead to difficulties when considering the second problem "*Is the agent likely to be mutagenic in man?*" One commonplace agent, caffeine, illustrates well the difficulties that may arise. Caffeine was shown to be mutagenic in bacteria by several groups of workers. They all, however, used bacteria growing under growth-limiting conditions in a continuous culture apparatus. When other workers looked for visible chromosomal damage in animal and plant cells they found plenty and became so worried that as recently as 1968 caffeine was described as "one of the most dangerous mutagens in man". But not all bacterial workers could repeat the results obtained with growth-limited cells when they used conventional growth conditions, and some even claimed an antimutagenic effect. *Drosophila* also seemed resistant to mutagenesis by caffeine. Tests with mice, both specific locus and dominant lethal, have now been carried out at some expense and have failed to detect any significant effect. Recently we have used cultured hamster cells and found a consistent lowering of the spontaneous gene mutation frequency in the presence of caffeine. Thus in the systems which are most closely related to the human system we have negative results and may conclude that caffeine is unlikely to be mutagenic for man. Which is just as well, as the ovaries and testes of habitual coffee drinkers are permanently bathed in caffeine at a concentration of around 1 microgramme per millilitre ($\mu\text{g/ml}$). Not all suspected mutagens, however, are convicted or

acquitted as easily as caffeine.

One further fact has to be kept in mind at this stage. As all toxicologists know, low concentrations of a chemical may be completely harmless, even over a long period of time, because metabolic conversion or inactivation occurs before a sensitive tissue is penetrated. At higher concentrations the inactivation capacity of the body becomes saturated and toxic effects are manifested. The same may be true for mutagens, but with the difference that it would be extremely difficult to subject to experimental test. Moreover, it is possible that genetic material, even when damaged, may be repaired if the rate at which damage is induced is low enough. This certainly occurs with ionizing radiation. The outcome of either of these phenomena would be that a substance could be mutagenic in an acute test but non-mutagenic in a chronic exposure such as that to which man might be subjected.

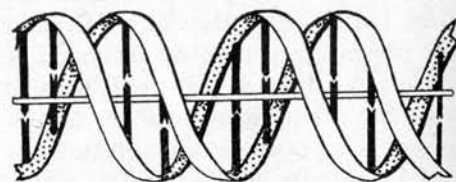
The next question which immediately poses problems is "*What dose of mutagen is being received, or is likely to be received by the population or individuals at risk?*" With ionizing radiation this has been one of the easiest questions to answer. The radiation level at any given time or place can be monitored and as most of the sources of radiation are known it has been relatively easy to calculate the average dose received by the population in any given time. Moreover, individuals known to be at high risk may carry their own personal film badges or cumulative dose monitors. It is also relatively simple to calculate the average dose of a substance such as caffeine which is consumed orally by almost the entire adult population from readily identified sources (coffee, tea, soft drinks) the annual consumption of which is known. In the case of caffeine, the gonad concentration is the same as the total body concentration since the drug permeates the tissues freely.

With other agents, to determine an average dose for the population or even an individual would be a much more difficult task. Imagine trying to do this, for example, for a vaporising fly killer, or "miracle compound XYZ" in a washing-up detergent, or a motor fuel additive, or a garden weedkiller, or a fungicide used to stop fruit rotting in storage and transit.

Of course, if one cannot make an acceptable estimate of the dose one is

not in any position to answer the fourth question "*What is the risk from being exposed to the agent?*" Even where one has knowledge of the dose, things are not necessarily easy. The quantitative response may vary from one test system to another, and specific locus data from the mouse may be available for only one concentration of chemical if at all. Data may be readily obtained with cultured mammalian cells, but it is too early to say whether one may justifiably extrapolate the results quantitatively to human gonadal cells. In these circumstances, the best that can be attempted could be little more than an inspired guess.

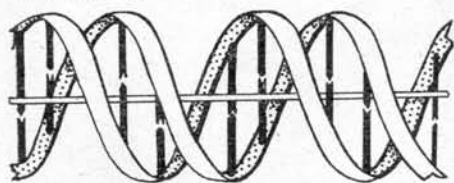
Provided a satisfactory answer can be given to the first four questions, only then is it possible to decide whether the risk is acceptable, but this confronts us with the fifth question: "*What is an acceptable risk?*" It is possible to argue forcefully that no new genetic hazard should be added to the environment. Certainly, if an adequate substitute were available, one would hope that any industrial or domestic substance which was shown to be a likely mutagen in man would be banned. Similarly with mutagenic substances whose benefits to society are not large, a limited period of time could be allowed for an adequate substitute to be found before a ban was brought into force.



There will, however, be substances for whose function there is no adequate substitute, and whose benefits are clearly large. Some attempt at limitation, based on knowledge of both risk and benefit, has to be made in such cases. It is important to realise that there is such a thing as an acceptable risk. Every time we drive a car, take the pill, drink a glass of wine or smoke a cigarette, we take a risk, in order to obtain something which is to us a benefit. Unfortunately, what different individuals consider to be an acceptable risk varies enormously, as may be seen from the extreme attitudes towards smoking and drinking found within our population.

Considering radiation again as a precedent, one may note that the International Commission on Radiological Protection, with great caution, defined

as an acceptable risk one "that is not unacceptable to the individual and to the population at large." (One may well enquire whether the opportunity to express an opinion on this matter has ever been given to us, either as individuals or as members of the population at large. Such limits become accepted by default!)



As the ICRP concluded, it is "not possible to define acceptability in a quantitative way", and behind their recommendations there has been the assumption that a doubling of the spontaneous rate of occurrence of genetic damage would be acceptable. Although the doses of radiation calculated to produce such doubling have been subject to attack and modification, the basic premise has largely passed unchallenged and it may be assumed that the majority of informed people accept a doubling of the mutation rate as acceptable in view of diagnostic X-radiation, isotope techniques in medicine and industry, nuclear power and other benefits of atomic energy. What is unlikely, however, is that informed people would tolerate more than an overall doubling, whatever the benefits from any environmental mutagen. It follows that what is a suitable recommendation for one mutagen (i.e., radiation) will not suffice when considering each of a number of mutagens. It has been estimated that about a thousand new chemicals are introduced into the environment each year, of which no more than a minute fraction are tested for mutagenic activity. If a thousand mutagens were each allowed at population doses which doubled the spontaneous rate, then the overall rate might go up a thousandfold, quite apart from any synergistic interaction which might occur.

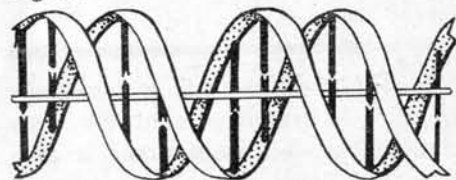
Following the logic of the ICRP, recommendations we should affirm that the overall mutation rate for *all* environmental mutagens must be kept within a doubling of the spontaneous rate. Two things, in particular, follow from this principle. The first is that knowledge is required of *all* environmental agents with a significant mutagenic risk. This presupposes testing, not only of all new chemicals, but also of all those already

widely distributed which might be suspected of having genetic effects—a formidable task especially in view of difficulties described above. The other consequence is that the present limits for radiation exposure, both for populations and individuals, may have to be severely tightened. **Radiation will have to compete for the privilege of damaging us with all other physical and chemical mutagens.**

One way of approaching this would be to reconstitute the existing radiation organisations, national and international, so that they become responsible for limiting all exposure to environmental agents, constituting a genetic hazard. Unless something like this is done, the deliberations of the present radiation bodies could conceivably become increasingly futile as radiation hazards pale into insignificance when compared with those from chemical agents. On the other hand, if it were done, environmental mutagenesis would benefit enormously from the organisation and experience of radiation workers. Such a step would be regarded as a wise precaution rather than a panic measure. It should be emphasised that at the present moment although we know of a number of pesticides with mutagenic properties, it has yet to be established (possibly because of the inadequacy of the avail-

able information) that any of them constitute a hazard to man. Doubtless the relevant safety committees are keeping themselves informed and would act if they thought a hazard existed. Sooner or later, however, they are likely to be faced with a decision which can only be made in the light of the overall genetic hazard from the environment, hence the advisability of setting up a body with overall responsibility.

From the foregoing discussion, it is clear that many problems and difficulties may arise at each of the five stages at which decisions must be made. The problem facing us is immense, though perhaps not impossible. A solution must be attempted. If I end with a cliché, let it be someone else's (J. V. Neel's). "Man's most precious possession is his genetic endowment. Each generation holds it in trust for subsequent generations. In order to support our technology we may have to compromise with the desire of the geneticist for no increase in mutation rates—but we owe it to our offspring to see that the compromise is based on knowledge rather than a guess we may later regret."



"Now this group had the same attention as the rest except we played antipollution speeches to it for six hours a day."

In defence of the primitive

by Conrad Gorinsky



Primitive peoples are of intrinsic importance. They have a vital contribution to make to our world, and we can ensure their survival by helping them to do so.

The word primitive has a derogatory meaning in everyday usage. We imply disapproval when we say that the facilities of a hotel are primitive, or that the way of life of some person is primitive. In this context a primitive state is considered undesirable.

This attitude is a direct consequence of an intellectual commitment to the concept of progress. We conjure up a picture of social evolution or progress, and we come to accept this picture as immutable. We consider that we have progressed from a primitive state, and therefore to propose the re-evaluation of a primitive state is to advocate a retrograde step. We claim to have advanced from *small* primitive tribes to *mammoth* super tribes, dominance being the sole measure of success. In common with some creatures of the past, we are also becoming too large, too specialised and too inflexible. It is this situation that should be borne in mind when we consider a primitive tribe: most of them number not more than a few hundred.

It might be conceded that some primitivism in arts and crafts is of interest and therefore a benign protection of these elements is desirable. Sentiment

may also play a part; or some primitive groups may be thought to embody a few quaint features worthy of study and so warrant protection as research material of academic interest. Paternalistic or humanitarian motives may also be apparent in the defence of primitive peoples—but these motives lack real force of argument in the face of the needs of the great democracies. The minority rights of sixty or eighty persons hold little sway against the weight of millions. This is the basic position of the primitive.

It is the purpose of this article to point out the *intrinsic value* of primitive peoples and the *vital contribution* they can make to our world. Only by providing primitive people with the *means* and the *dignity* to make this contribution will there be any hope for them and, for that matter, ourselves.

Our attitude towards the word primitive is a good indication of the extent of our alienation from the intrinsic, basic, vital and, in a word, *primitive* elements of nature (which of course include ourselves).

One must realise that primitive peoples are intimately tied up with the environmental crisis and also that they have a *critical* role to play in nothing less than our own survival.

The real danger facing primitive peoples of the world is not from bandits and other riff-raff but from our own attitudes and philosophy. The fight for their survival is not to be conducted in the forests and in the countryside but in the cities of the world. Destruction

may be meted out in the field but the order is dictated from the city.

As with all environmental problems, it is the directive that must be questioned. What is decided in the city today will be accepted in the rest of the world tomorrow. In war, the criminal is not the poor soldier swinging the sword, and even less so is it the inanimate sword. It is futile to go wailing into the wilderness totting up swords after some massacre—all the documentation in the world is useless after the deed.

Take the blue whale: it does not matter whether twenty or two thousand whaling ships are after the blue whale or whether its food is being depleted by ocean pollutants—the fact is the whale is in a crisis situation. Whether the final thrust comes from a harpoon gun, with or without an explosive head or from a broken heart (the oceans being too big for it to find its mate) is of no real consequence. Accurate documentation of the end is the most futile of gestures. What is important and incontrovertible is that we can never replace it and that it did not die because of some evolutionary process. Well over 800 species are now on the verge of extinction—by our actions. It is civilised man, with his great art, his great music and his great science that will swing the sword. It will be his philosophy that will demand it.

“The fact is that these areas where primitives live must be developed—man must advance—the wilderness must fall and with it all that it sustains.”

It is this philosophy that must be removed and this can only be achieved by providing an alternative philosophy.

Primitive man depends on the wilderness—without it he ceases to exist. The giant otter (*Pteronura braziliensis*) is itself on the verge of extinction due to European demand for its skin. Curiously, it is venerated by the Guaiaca Indians who regard the animal as sacred and look upon all giant otters (of both sexes) as female relations of the tribe. The Makiritare Indians also do not kill *Pteronura*—unless their love of gain is played on by hidehunters. Its survival in the Manu National Park in Peru is attributed to the guardianship of the Amawaka Indians, whose warlike activities have thus far deterred the pro-

fessional hidehunters. Manu National Park is the only place in Peru where the species remains well represented.

It is my view that the extinction of the primitive will herald our own. Man has existed on this planet for probably little more than a million years. A tiny fraction of that time, a few thousand years, is represented by civilised man. He cleared the wilderness and established himself. Most of the forests were never regenerated as a result of the introduction of domesticated animals which cut back the vegetation. Agriculture and over-grazing have produced many present-day dustbowls and might explain why much of the old fertile crescent is now scrubland and desert.

Contemporary man has consumed

and destroyed more in the last forty years than in the whole of the rest of man's history.

It is in our own time that technological man has emerged (not evolved), and it is our own time, the next thirty years, that will witness the most critical phases for most life forms—including man. One must remember that our own population will double during this period.

A conscious effort must be made to appreciate the vital need to maintain a diversity of species of plants and animals, which we cannot replace. We must respect and maintain a diversity of cultures among man, especially now when traditions are crumbling in a destructive rather than a critical wave of opinion. Man is at war not only with himself but also with nature. The answer cannot be found by continuing the expansion of human habitation, the felling of trees, and the mindless disruption of the earth to conform to man's wishes. Man may not be capable of mastering the elements yet, but he certainly has the capacity to undertake global experiments—and global mistakes.

Whether it is in modern man's best interests to displace other human customs and traditions and other living creatures from the earth to make room for him is the crucial question that faces us all now.

The plight of the Amerindian in Amazonas is a good measure of one's intent and one's state of concern.

We should be working out systems which would involve the primitive in the vital task of securing our biological heritage. Ecological zones should be designated for this purpose in areas where primitive peoples live.

Institutes for ecological studies should be established in which primitive peoples could make use of their accumulated knowledge of the environment and use their acknowledged expertise. Special courses, consistent with these needs should be devised and directed by these institutes located in various parts of the world. Of course the priority areas are South America and South-east Asia.

Finance to support these projects should be obtained from the industrialised nations as a fee towards the maintenance of the world environment.

Only by establishing this reciprocal approach and acknowledging the authority of these people and to be *seen* by

Degradation and despair, as expressed in the faces of these recently-contacted Guaiacas of Venezuelan Amazonas, are the inevitable results of the advance of "civilisation".



them to be doing so will it be possible to escape the devastating trauma that they are encountering. Shame can be as great a killer as disease and they may both be linked in the mind of the primitive.

The botanical world is extremely complex and many useful plants have been obtained from primitive man; for example, all our food plants have originated from his knowledge. It should be remembered that without plants neither man nor any other animal could survive. Also, the lives of primitive food-gathering peoples may depend as much on knowing which plant is poisonous as which is nutritious. In Amazonas, the Amerindian's knowledge of plants is immense as he is a supreme naturalist and is nomadic or semi-nomadic in an area of vast botanic potential.

It is in this field—sensitivity to our environment—that our culture is most deficient. Biological awareness is not a characteristic of our culture. It is in this field that we have most to gain and it is in this approach that a meaningful position can be secured for the primitive and with him the viability of the natural world.

The UNESCO Man and the Biosphere Programme should include primitive man in its proposed activities and the Primitive Peoples Fund should be effective in this purpose. An Ethnobotanical Programme would depend largely on the participation of primitive man and without him little can be achieved. His authority should not be dismissed out of prejudice on the grounds that his sages and doctors happen to be wearing feathers rather than suits. This proposition is not so naive or impractical as it might appear.

The wilderness may not be so obviously vital to the welfare of modern man. But how many of us leave our offices, laboratories and factories and seek to enjoy a holiday in the closest thing that we can find to unspoiled nature. Admittedly we make massive compromises and why not, technology and nature need not be incompatible and why should we not strive for the best of both worlds?

Conrad Gorinsky, whose main interest is ethnobotany, has travelled widely in South America and is currently engaged in chemical research at St. Bartholomew's Medical College, London.

The need for wilderness

by Robert Allen and Edward Goldsmith

“Could we not make the west into a great park where man, the denizens of the wild, and the scenery should be one vast park?”

William Catlin, the remarkable painter of the North American Indian, made this plea in the early part of the last century, long before the national park concept was seriously contemplated. He is quoted by Sir Frank Fraser Darling in his closing address to the Conference on Productivity and Conservation in Northern Circumpolar Lands—that last great wilderness area in the northern hemisphere; and Sir Frank goes on to say, “I see no reason why any national park in the Arctic should not remain inviolably the country of the indigenous people who use it in pursuit of their life ways. The Eskimos did not damage the permafrost and most of the Indians who lived in these Arctic and sub-Arctic areas have not greatly damaged the environment either. I see no reason why they should not be left to live their lives within that area. And on that line I would also follow up by saying that these people, Eskimos and Indians, know their country; they can live in it, move in it, better than we can, and could they not come much more into our lives by being the custodians of the Arctic?... It is their country. This is a way of our impressing on them and on ourselves that it is their country”.¹

It is their country; they know it better than we do; let them look after it on behalf of the world. This is the nub of our argument on behalf of the hunter-gatherers and gatherer-farmers² of the world's two most misunderstood biomes—the arctic tundra and the tropical rain forest.

There is a real possibility that we will have destroyed the rain forest before we come to understand it. At the moment, we value it only for a few plants, principally timbers like mahogany and greenheart. For the rest it is considered useless, best cut down in the search for minerals or cleared for agriculture. But modern agricultural methods are impractical in the tropical forest. Once the forest cover is removed the soil

oxidises rapidly or is washed away, so that although intensive agriculture may be more productive than traditional methods over a season or two, in the long-term it is thoroughly wasteful. Mining brings much greater returns over the short-term and these may be considered sufficient to justify the gross ecological destruction associated with it. But no country can afford to squander the vast yet fragile wealth of the forest. As P. W. Richards puts it:

“To a botanist the policy of concentrating attention on a small number of ‘economically valuable’ species suggests certain doubts. Among the many thousands of species of rain-forest trees there is only a small fraction of which the properties, mechanical, technical, biochemical, etc., are even approximately known. Among the rapidly disappearing majority of ‘useless’ species there may be many of unsuspected value... The reservoir of natural material represented by the rain-forest flora is in danger of disappearing before its value has been adequately explored”.³

In the hunter-gatherers and gatherer-farmers of the forest—for example the Punan and Negritos of Malaysia, the Onge of the Andaman Islands, the Pygmies of the Congo, and many of the Amerindians of Amazonas—we have the indisputable authorities on rain forest ecology—especially its plant life. In a sense primitive plant-knowledge may be regarded as an under-exploited resource (curare, cocaine, quinine, cassava and maize represent a small part of Amerindian learning, for example). It is also an integral part of their culture, one of which they are justifiably proud. If we are seen to respect them as naturalists we are on the road to a dignified meeting and sharing of two equally valuable cultures, rather than the cruel and irresponsible destruction of one by the other.

What both the peoples of the tropical forests and those of the circumpolar

regions need is a massive campaign to secure their rights by giving them title to their lands, creating conservation areas around them and ensuring that these are respected. An ecological programme associated with the conservation areas is also needed.

In general the less developed countries have the wilderness, the developed countries have the money, so that while sovereignty obviously should remain with the country in which a wilderness area lies, we propose the developed countries pay compensation to the host country in lieu of the income it might otherwise have expected.

Governments could take the first step in this direction at the UN Man and the Environment Conference in 1972. The two headings drawn up by the Preparatory Committee which appear relevant are (1) the World Heritage Foundation, under which it is proposed that certain areas of natural, cultural, historical or scientific significance be accorded special recognition; and (2) the rational conservation of world genetic resources, under which measures may be agreed to halt the accelerating rate of plant and animal species extinction by preserving important habitats. *The Ecologist* recommends that:

1. certain wilderness areas be declared inviolate; which initially shall be areas of arctic tundra (especially in Canada and Alaska) and tropical forest (especially in Indonesia, Malaysia, India, Congo, Gabon, Cameroun, Brazil, Colombia, Venezuela, Peru, Guyana), these being the least understood and most fragile biomes. Ultimately they could also include tropical scrub areas, as in Australia, Botswana, SW Africa;

2. the hunter-gatherers and gatherer-farmers within these areas be given title to their lands (i.e. those lands in which traditionally they have gained their living) and be allowed to live there without pressure of any kind;

3. severe restrictions be placed on entry to these areas by anyone who does not live there permanently (while allowing the indigenes free movement).

4. sovereignty over the areas remain with the countries in which they lie, who should also be responsible for the policing of their boundaries;

5. funds for administration of these areas together with payments in lieu of exploitation (to the host country) be collected from UN members in proportion to their GNP;

6. an international committee be

appointed (possibly reporting to IUCN and/or UNESCO) to supervise an ecological programme of research, the results of which should be freely available to participating countries.

The benefits of this proposal:

- a. to the world (both developed and less developed)—those parts of the planet which hold great botanical and zoological riches of which we are presently ignorant and are close to destroying will be safeguarded until we know their real value. Our understanding of them will be much assisted by our studying the knowledge of plants (ethnobotany) and animal behaviour (ethnoethology) of those peoples who have lived there for generations—an investment in irreplaceable human experience.

- b. to the host countries—as (a) above, plus substantial compensation in lieu of exploitation.

- c. to the hunter-gatherers and gatherer-farmers within the areas⁴—security through title to their lands; the freedom to live their own lives; dignity and a renewed sense of their own worth in the modern world. Few people realise what an immense psychological impact our technology has on primitive peoples. At a time when our own civilisation is being forced to choose between self-destruction and an alternative value system we could do well to show them that we respect them and wish to learn from them. This for all humankind will be the greatest benefit.

Notes

1. Darling, Sir Frank Fraser, 1970, "Tundra Conference Summary". In Fuller, W. A., and P. G. Kevan (eds.), *Proceedings of the Conference on Productivity and Conservation in Northern Circumpolar Lands*, Edmonton, Alberta, 15-17 October 1969, IUCN, 16.

2. A distinction is made between shifting (slash-and-burn or swidden) cultivators who depend very little on hunting, gathering or fishing, and those to whom one or more of these practices is important. The latter are referred to here as gatherer-farmers. The significance of this distinction will be discussed in a later article.

3. Richards, P. W., 1966, *The Tropical Rain Forest: an ecological study*, Cambridge University Press.

4. Most of the peoples considered in this proposal find western/industrial thought-processes so odd and incomprehensible that to include them in detailed deliberations about these areas would be more distressing than helpful. Others, however, especially Eskimos and North American Indians, quite rightly insist on participation and should be invited to do so.

The Primitive Peoples Fund

The Primitive Peoples Fund (incorporating Survival International) is the only charity entirely concerned with helping primitive peoples throughout the world. Its immediate aims are:

1. *Grants for specific action* to help primitive peoples in urgent need. Already sums have been voted and a list of priority projects is being prepared as information accumulates.

2. *Arousing world public opinion* about the grave danger that primitive peoples are in, with the hope of developing a social conscience that is tolerant and protective towards them. The public must be informed of the value of primitive peoples, their arts, societies and knowledge. Exhibitions, films, television programmes and conferences will be encouraged.

3. *Danger areas* in the Americas, eastern Asia, Oceania, Australasia, and Africa must be studied to investigate the circumstances and rights of their primitive peoples. A schedule of the ways these rights must be respected in practice will be drawn up and presented for ratification to the UN and its member states.*

4. *International support* will be given to local publicity and fund-raising campaigns, and to the formation of similar bodies in other countries, particularly those with primitive peoples.

5. *Combating disease*, malnutrition poverty and landlessness both by direct aid and by pressing for the betterment of existing conditions and laws.

6. *Education*: help must be given to primitive peoples so that they can adapt to a changing world without loss of identity. Studies must be made of the best ways in which this can be done.

7. *Combating environmental destruction*: research must be initiated, in co-operation with conservation organisations, into ways of saving or creating environments in which primitive peoples can continue to live their own lives securely, should they so desire.

Further details may be obtained from The Primitive Peoples Fund (inc. Survival International), 36 Craven Street, London WC2. Tel: 01-839 3267.

* Robin Hanbury Tenison has recently returned from the first of such study tours—in Brazil. We hope to publish his findings in a later issue of *The Ecologist*.

Reports

DDT Lunacy

A most revealing letter appeared in the November 27th 1970 issue of *Science*. It emphasised the fact that DDT is addictive and that an addicted area can never do without it again—as this poison, by its very nature, must destroy all natural controls. The experience of Ceylon is particularly illustrative. As soon as its use was abandoned “there were over one million cases of human malaria in a population of ten million people and no part of the island of Ceylon was free of the disease or its vector”. The situation was so serious that “...the Singhalese government sent out an emergency call for 10 million pounds of DDT in 1969 to recover control”. The writer also cites similar experiences with forest insects in Sweden and with the gypsy moth in the Eastern States of America.

It is curious that what to any serious scientist would constitute a particularly damning indictment of DDT was designed to show how splendid and irreplaceable it is. The writer for instance points out that “the World Health Organisation has critically examined over 1,000 such possible substitute pesticides to replace DDT in the worldwide antimalaria programme, and has found none that can meet the essential

requirements of availability, efficacy, safety, stability and cost”.

I shall not bother to comment on the extent to which DDT in fact satisfies these—in some cases—contradictory criteria. This statement, however, is a truly frightening one, especially after the publication of such revealing books as *Chemical Fallout* and *Man's Impact on the Global Environment*.

The writer considers that it is only over-emotional and ignorant laymen who attack the uses of DDT. He ends his letter with the following plea: “Will the afflicted public finally be aroused to return the administration of pesticides to trained and experienced scientists, operators and administrative officers who are obviously best qualified to exercise such jurisdiction?”

The answer to this must be: yes, when such individuals are capable of judging the long-term effects of their work on the biosphere as a whole and not simply its immediate effects on that small section of it that happens to fall within the narrow compass of their specific discipline.

What is particularly alarming about this astonishing letter is that it should have been written by one whose job should be to contribute in some way towards the protection of our environment against such poisons as DDT. He is Robert White Stevens, Bureau of Conservation and Environment, Rutgers University, New Brunswick, New Jersey, 08903, USA.

Edward Goldsmith

John Barr

The early death of John Barr has taken from this country one of its very best environment writers. It has taken from his friends a warm and gentle person. As a writer, he gave to his work two qualities especially: a prodigious industry and a real concern. These features are apparent in his best work—*Derelict Britain* and *The Assault on our Senses* and some of his contributions to *New Society* and the BBC. Since he never wrote off the top of his head, his work was both fact-packed and well argued. And because of this, his work had impact. Much of the present awareness of the problem of derelict land and its social impact is due to John Barr.

Few environment writers knew better than he what is at stake. He loved the country and the wilderness and natural things. While he worked in London, his friends knew he found it only a necessary evil; he fretted to go with his wife—Pat Barr the author—to their croft on the windswept Scottish island of Coll.

His last work was a fine series of BBC Three programmes on noise, to be repeated this summer, and the editing of an English edition of *The Environmental Handbook*. He was 44.

Jeremy Bugler

Fessenheim—Easter Monday

While the British appear to have accepted their growing numbers of nuclear reactors with scarcely a murmur of protest, elsewhere the public is beginning to have grave doubts about the long-term safety of these technological giants. On Easter Monday when people in Britain were marching for the CND a crowd of more than 1,500 congregated in front of the town hall in the small Alsatian town of Fessenheim to protest against the construction of an 850 megawatt (MW) nuclear reactor some 3 km away on the banks of the Rhine.

Then, with placards proclaiming “Yes to science—No to nuclear reactors” the demonstrators set off out of the town in complete silence—their destination EDF's (*L'Electricité de France*) proposed site for the reactor. After speeches the demonstration organisers—*Le Comité pour la Sauvegarde de Fessenheim et de la plaine de Rhin*—released hundreds of balloons each one symbolically inscribed with



Reports

the name of a well-known radioactive element—strontium-90, tritium, krypton-85, iodine-131, caesium-137, etc.

CSFR was started by several of the local inhabitants who were deeply worried about EDF's rather appalling record with nuclear reactors—including a "meltdown" in the core of the Saint-Laurent-des-Eaux reactor in October 1969. But when these individuals tried to get information from EDF about the safety of the Fessenheim plant and the levels of radioactive effluent to be re-released during its normal operation they were fobbed off, so they claim, with totally unsatisfactory replies.

CSFR is now gathering 10,000 signatures for a petition to be sent to President Pompidou, having so far got more than 5,700 people to sign. How successful the citizens of Fessenheim and the neighbouring villages will be remains to be seen. Earlier this year the French President said in no uncertain terms what he would do to anyone protesting against nuclear reactors—"*Le premier qui me parle de centrales atomiques, je le flanque par la fenêtre.*" ("The first person who talks to me against nuclear reactors, I shall chuck him out of the window.")

At the same time as the Fessenheim demonstration two newly-formed British groups organised a token demonstration in support of CSFR outside the French Embassy in London. Britain, with 27 experimental and electricity-generating reactors in existence, has more nuclear reactors and has generated more power by this means than any other country in the world. Why then should these two groups—the Campaign for Biological Sanity (CBS) and Friends of the Earth (FOE)—have chosen a French protest for their debut? The reason, say the organisers of the British demonstration, was to shake people in Britain out of their complacency regarding nuclear reactors and to show them the concern people feel elsewhere. (For example, how many CND members have ever given any thought to nuclear reactors.)

And what are the reasons for being concerned? The CBS—started by John Papworth, the Editor of *Resurgence*—and FOE point out that a reactor has a working life of about 30 years. After that time, because it is intensely radio-

active the concrete-enshrouded core has to be left intact. "If we continue to use nuclear power," say the two British groups, "we can expect the landscape to be littered with highly dangerous cathedral-sized hulks."

During its lifetime a reactor produces many hundreds of times the radioactive waste released over Hiroshima and Nagasaki by the bombs. Although the atomic authorities claim here and elsewhere they have foolproof methods of disposal, a number of containers, brimming with millions of curies of waste, are already failing after less than 25 years' use. For the safety of mankind the containers must remain intact for hundreds and even thousands of years.

Over and above the highly radioactive wastes generated, each reactor releases low levels of waste into the environment. The CBS and FOE both claim that with the number of reactors needed to supply future global energy demands—assuming the same pattern of industrial growth as is now evident—"this waste will eventually build up to a biologically intolerable point".

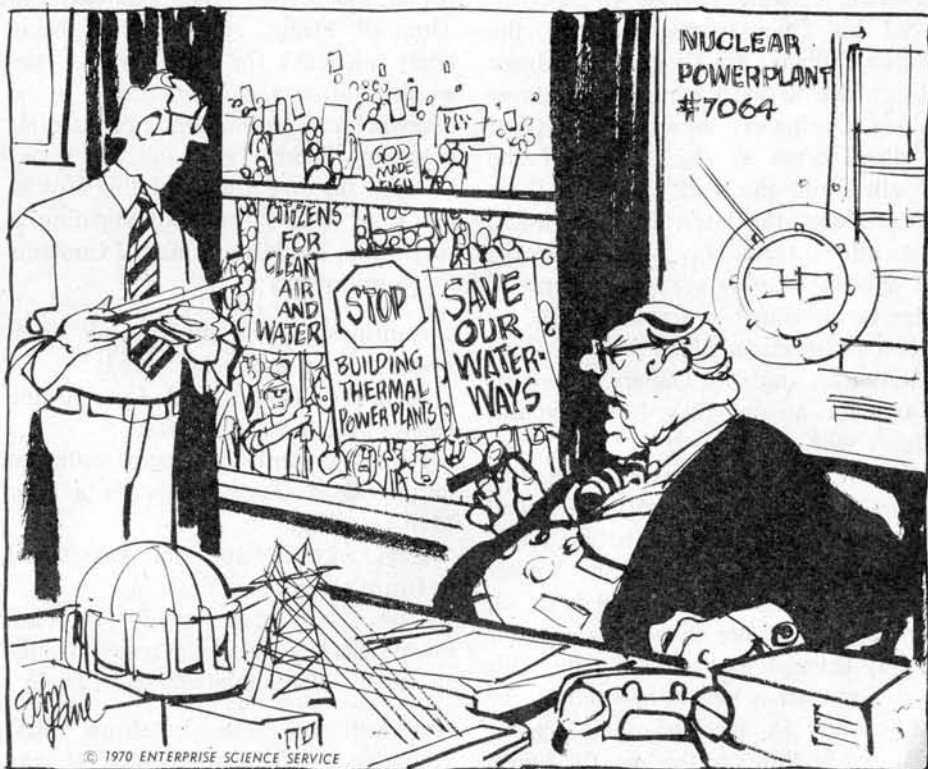
Although reactors are claimed to be "clean and safe" very few of them have operated without an incident of some kind or another. With the world's energy demands rising fast and shortages in oil imminent the number of reactors necessary will increase to a point where one large 1000 MW reactor will have to come into operation some-

where in the world every day of the year. Once a reactor has been operational the public is at risk because of accidents or because of sabotage and war. The transportation of highly toxic radioactive wastes from the reactors to processing plants and to disposal points also constitutes a grave threat to the public at large.

With oil prices going up by leaps and bounds and the political uncertainties surrounding the oil-producing countries, nations like Britain and France are turning more and more to nuclear power as an alternative. Britain is putting up some half-dozen new reactors at present and France is planning to build 10-12 reactors over the next decade.

The problem is to find cheap reliable sources of uranium and the UK Atomic Energy Authority has recently signed a contract with the Rio Tinto-Zinc mining company in South West Africa for £150 million worth of uranium. This contract obviously complicates Britain's involvement and dependence on South Africa—and it means that Britain is tacitly aiding and abetting South Africa's claims to territories that it has no right to. Like oil, point out the demonstrators, uranium is fast becoming a major political issue—and once again it is the underdeveloped country rather than the industrialised one which loses out.

Both groups—the Campaign for



"What's the difference how a fish dies? If the thermal pollution doesn't get him, some fisherman will."

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Biological Sanity and Friends of the Earth—believe that one of the answers to the world's energy problems lies in a radical re-assessment of the essential requirements. Unmitigated expansion and economic growth on the big scale envisaged by the industrial nations can only lead to disaster, so they believe. More modest energy requirements, on the other hand, could be met for a long time to come by the shrewd use of conventional fossil fuel sources.

Peter Bunyard

If you would like to help CBS or FOE contact them at these addresses:

Campaign for Biological Sanity,
24 Abercorn Place, London NW8.
Tel: 01-286 4366.

Friends of the Earth,
8 King Street, London WC2.
Tel: 01-836 0718.

Gulliver in Automobilia, IV: Wherein the Author considers the Disposal of Refuse

The Apostle Luke relates of the Athenians that they spent their Time in nothing else, but either to tell, or to hear some new Thing. This Enthusiasm for Novelty he evidently accounts a Fault in them. It were curious to discover what his Opinion might be of the Automobilians: for they are wondrous susceptible to the Charms of whatever is new. During my Sojourn among them I dined often at the Tables of the Quality, and the Talk was all of the latest News, the latest Book, Musick, Play and so forth. Nay, even the Works of ancient Masters are noticed only if they be presented in a novel Guise: as when a Nobleman's Heir sells the Contents of his ancestral Gallery to pay his Taxes, or an old Play is tricked out afresh with new Bawdry.

Where the very Patrons of the Arts are so partial, it is scarce to be hoped that the Mob will show better Sense. The Art most esteemed by the Vulgar is Balladry: and a Song that is on all Lips in May, were shown rare Favour if any listened to it still in July. This Lust for what is new is fostered by the Merchants to increase their Trade; who, while they cry this Year's Wares, omit not to decry those of last Year. The gullible Populace are induced to

discard serviceable Goods for others superior in no Respect but their Newness: and by this Means the Labourers and Tradesmen are kept in Employment. Patching and Darning are quite gone out of Fashion; there is not a Tinker to be met with, and even Cobblers are seldom found: the very Launderers fear the increased Use of Undergarments of Paper, which are donned new of a Morning, and cast away the same Night. The humblest domestick Necessaries come to the House wrapt in such a swaddling Integument as would perplex our English Housewives: in a Grocer's Shop you may see not a Particle of Food exposed to the Air, but all inclosed in Boxes and Bags, measured out ready for Sale; which Wrappings are no sooner brought home, than they are rejected as of no further use.

My Readers will scarce believe what I must now tell them: yet being resolved to tell the whole Truth in this History, I will persevere. Outside every Dwelling in Automobilia stands a Tub or Bin, commonly of Iron, about the Bigness of a Beer-barrel, in which are placed the Wastes of the Household (the Refuse of the Privy alone excepted): and so speedy is the Accumulation of diverse Matter in these Receptacles, that they must be emptied every seventh Day into great Wagons, employed at publick Expense to go round the Streets, like Pest-carts in Time of Plague. This Service being lately withheld for some Weeks, the whole Nation seemed doomed to be overwhelmed, like an Oasis beneath incroaching Sands. I was much perplexed to learn the Ingredients of this Hotch-potch of Offals; and investigating a single Bin, found its principal Contents to be as follows:

Imprimis, xij Canisters of Iron, wherein Food had been stored;

Item, viij Bottles and Jars of fine Glass, with metal Stoppers;

Item, a Quantity of Scraps sufficient to provide a Day's Meals for a poor Man or a Pig;

Item, enough Paper and Pasteboard to furnish a good Folio Bible;

Item, numerous small Articles, mostly Containers, of the resinous Substance the Automobilians call Plastic.

It will be seen herefrom what Abundance of useful Materials, the Product of Men's Labour, is treated as worthless. Indeed, I was informed that

the Authorities are put to great Expense to dispose of it: often conveying it many Miles out of the Cities to discharge it into vast Pits, so that the Minerals which last Year Men did sweat to dig from the Earth, this Year they labour to bury again. Nor can the domestick Bins contain all the Superfluities of a Household: he who would be rid of a Carriage, or a Stove, or another of the mechanical Contrivances by which this People sets such Store, must needs pay the Breaker to bear it away, or himself take it from his House by Night and abandon it privily by the Wayside, as the old Greeks were wont to expose unwanted Infants. To such Stratagems must they resort to rid themselves, of the Midas-gift of their own Prosperity: and ever and anon felicitate themselves, for they measure the Wealth of a Man or a Nation, not by the Benefits it bestows, but by the Waste it produces; which is as much as to say, that they judge a Chimney not by the Fire, but by the Soot.

Nicholas Gould

Poem

Seen from a train on a journey to London

White horse in a field
Cropping alone
Among the thistles.
White mane graceful lying,
Nostrils touching green world,
Neck extended, body engrossed,
In its world of food and hedge,
Needless of passing train.
Kind of microcosm
In a field.
A white being
Alone.

*Encapsuled humanity
on rapid rotating
wheel
rushes by
in its adrenal
and lemming-like
flight
to the long precipice.
A mile away the colossus
of new-town towers
above the box-jungle.
Then elite exurbian
undergrowth.
Encircling all
is the bye-pass
octopus.*

I look out and rejoice
At the white horse
Here in its corner
Of the macrocosm.
Feeding and breathing,
Graceful mane lying;
The field its allotted space
Of food and water and peace.
Martin Gildoch

In the next issue of The Ecologist

Social disintegration and its causes, by Edward Goldsmith.

Has Oxford a future? by Helen Turner.

Violence and social disorganisation, by J. P. Scott and Richard F. Gottier

also *The man who sued the Torrey*

Canyon; Polynesian blood pressure; Environment and birth defects; New hotels—with reservations plus all the usual columns: Towards a unified science, by Edward Goldsmith; *Down to earth*, by Lawrence D. Hills, *Ecopolitics* by Robert Allen; *Ecotechnics* by Arthur J. Puffett.

Coming events

2, 9, & 16 June—Series of three meetings on Man the Endangered Species from 7.30 pm to 9.30 pm at the Refectory, Theobalds Park School Field Annexe, Bulls Cross Ride, Waltham Cross, Herts. Full details from the Officer in Charge, Capel Manor Horticultural Centre, Bulls Moor Lane, Waltham Cross, Herts.

30 June & 7 & 14 July—Repeat of above.

7 June—The Case for a Real Doomwatch. Seminar led by Kit Pedler from 5 pm to 6.30 pm at Linacre College, Oxford.

16-18 June—Symposium, "Pollution and the Environment", at the University of Lancaster, Dept. of Biological Sciences and Environmental Sciences. To be held in the Bio-

logy and Environmental Sciences Lecture Theatre.

22-25 June—Environmental Pollution Control and Effluent and Water Treatment Exhibitions at Olympia, London. For full details including those of the supporting conferences (The Effluent and Water Treatment Convention; the Conference on Waste—Management Problem of the 70s; The Society of Environmental Engineers' Symposium; "Living in Towns"—Special Conference of the Association of Public Health Inspectors; and the Preventing Industrial Pollution Conference) write to Brintex Exhibitions Ltd., 3 Clements Inn, London WC2A 2DB (Tel: 01-242 1200).

Classified Adverts

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Down to Earth



by Lawrence D. Hills

Poisoned pastures

The world's pasture water is vastly more important than its pasture land, for the tiny plants of the phytoplankton that float and thrive as far as the sunlight falls through the fenceless meadows of the sea, give us each day 70 per cent of our daily oxygen. All the forests and fields of the wild green earth supply only the odd 30 per cent which would not keep us breathing and burning for even a year if once the oxygen cycle slows and stops.

If ever we over-feed and undergraze our watery pastures we could poison them as easily as we are poisoning our rivers and lakes with sewage, sewage effluent and the washings from our farmlands. Indeed, the USA has poisoned the Great Lakes, very largely with a fourteenfold increase in nitrogen fertilisers in the last 25 years. From British experiments on the Great Ouse we know that between a third and a quarter of our nitrate fertilisers washes quickly into our rivers, where, though it takes 10 parts per million to make the water undrinkable, only 0.3 ppm will begin the population explosion of algae which is technically called a "bloom".

Fresh water normally depends for nitrogen on *Azotobacter agilis*, which fixes it from the air dissolved in water as a better known bacteria does in the roots of pea tribe plants, and relatively little washes from unfertilised soil. When we suddenly add thousands of times more nitrogen than our rivers have ever received in history or pre-history, plus quantities of phosphorus from the breakdown of modern detergents in sewage effluent, it is as though some wonder fertiliser made grass grow 50 feet high and too coarse for cattle to eat. Grass, however, would become a peat for lack of the nitrogen to decay it, but the blanket weed algae grows furiously through spring and summer and then dies, to be attacked by bacteria increasing with explosive speed on unlimited nitrogen, demanding

oxygen so fast from the limited store dissolved in the water that the fish "drown" without any. The warmer the weather the less dissolved oxygen there is, and the faster the bacteria take it—so spectacular fish kills can happen in summer apart from the many cases of direct poisoning by industrial wastes.

This process, called "eutrophication", occurs when anything decays in water, especially raw sewage and once it has produced a complete kill by upsetting the oxygen balance, it is irreversible. Even if the sea recovered after we had poisoned most of its phytoplankton, the world would never be the same again. Man would be missing with all his fellow mammals, as well as the birds and the fish.

So far as rivers and lakes are concerned, eutrophication is merely overmanuring our watery pastures. Surely we could find something to keep pace with the algae and spread the oxygen demand safely, like a farmer buying store cattle to balance the grass that "runs away" with more grazing mouths, taking our profit in better fishing for the hundreds of thousands of anglers in Britain today?

Our freshwater fauna is very short of algae eaters, for most of our native fish are zooplankton eaters, and these live on freshwater phytoplankton, as in the sea, with a wide range of other "meat dishes" such as small crustaceans and larvae. We have nothing like the delicious Tilapia of Africa which will eat a third of its own weight of waterweed a day and produce about two tons of fish a year per acre of the ponds that are adding high grade protein to the local diets in so many hot and hungry countries today.

Tilapia will take a fly and it would be possible for a factory or power station with a cooling water problem to warm a pond with their waste heat, to stock with this useful fish, and Water Hyacinth (*Eichornia crassipes*) which is perhaps the most efficient converter of unwanted plant foods into vegetable fodder, for them to feed on. There would be no risk of the Water Hyacinth, the floating plant from South America that has spread throughout the tropics, escaping to block our waterways with solid foliage, for our climate is too cold.

The Ministry of Agriculture, Fisheries and Food has some watchful ecologists in its middle department. They firmly refused entry to the Amer-

ican striped bass, which thrives in polluted water, because it preys on young migrating salmon, and are watching suspiciously the lake in Middlesex where an Angling Club managed to introduce 1,000 channel catfish, a favourite with American fish farmers. This creature will grow to 25 lb, is omnivorous, so could be a weed-eater alone in a large and overfed lake, and is good eating as well as a furious fighter.

The Ministry has had the most likely vegetarian of all on trial since 1968. This is the Hungarian strain of the Chinese grass carp, (*Ctenopharyngodon idella*) which can consume its own weight in weeds every 24 hours and has grown up to 100 lb, though thirty pounders are all that can be expected in British waters. They will only breed at temperatures above 50°F and our rivers are never this warm at the right season, so they would have to be bred artificially and released, which would prevent their becoming a kind of "water rabbit" and stripping our rivers like Australian sheep farms.

In Russia, after the same kind of ecological research that our Ministry is undertaking, 246,000 were released in the Karakum canal that was so weed grown for 65 miles that the flow was reduced to a fifth and water enough to irrigate 50,000 acres of cotton was lost. They solved the problem and are now balancing the weed growth so successfully that they have been introduced into the Volga and have eaten their way up as far as Stalingrad, but go down to the warm southern reaches to breed.

Unfortunately the weeds they clear are all the clean water species and they ignore floating algae and blanket or flannel weed. Even if they were algae eaters, releasing enough to keep pace with a "bloom" would mean an even bigger fish kill from starvation than from eutrophication, once they had eaten the thousandfold increase of "grazing" that farmland washings and sewage effluent forces ahead to draw the oxygen when it dies, rushing towards it like air to a burning warehouse.

Thirty pound grass carp, caught perhaps with cucumbers instead of worms, cruising like giant herrings in our canals, lakes and rivers are no easy way round the pollution problem, but a reward for cleaning up our rivers till they are again fit for both men and fish to swim in.



Towards a unified science

The directivity of behaviour

Science consists of organising data or putting "cybernismic" order into the environment. Things that appear unrelated and haphazard are arranged in such a way as to appear orderly. The environment is four-dimensional, or, more precisely, it can best be represented by a four-dimensional model. Thus it is not three-dimensional things into which order must be put, but four-dimensional processes. *To put order into the latter involves knowing in what direction they are moving.* If one cannot do this, they remain unrelated and haphazard, i.e. disorderly.

All behavioural processes must therefore be taken as being "directive"—a term coined by Russell in 1938.¹ I prefer this term to the term "purposive", which in fact means the same thing. Unfortunately, when we talk of somebody's purpose, we are not thinking of his role within some general system, but rather of his "conscious" motivation. If man's behaviour is determined by a mysterious force called the "free-will", then "purpose" refers to the direction in which the exercise of "free-will" is leading him, and in terms of which his behaviour can be explained. It must follow that since animals other than men are supposed to be governed by "blind instinct", they are not capable of exercising "free-will", and thus of displaying "purposive" behaviour.

Even if we use the word "purpose" functionally, its old metaphysical connotation tends to linger. If we use it, for instance, in connection with the behaviour of such lowly animals as sea-urchins or fiddler-crabs, subconsciously we cannot help but imagine these humble creatures consulting their little "wills" before deciding "freely" which zooplankton to have for tea. As this is not the image I wish to convey, it is easier to abandon the term "purposiveness", in favour of one with no such undesirable connotations.

To deny directivity is in fact to deny that processes can be the object of scientific study. In spite of this, empiricists obstinately persist in so doing. This is partly because they tend to regard three-dimensional things and one-dimensional processes apart, as though they were self-sufficient units. It is not currently realised that these units are nothing more than anthropocentric abstractions, units of our thought-processes and of our language but not of the world they represent. There are no such things as dogs that do not eat and drink 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.

To deny directivity is to deny that cybernismic order can be put into dynamic processes, and hence that they can be subjected to scientific examination, and, since all the constituents of the world display different degrees of dynamism, that science itself is in fact possible.

The evidence of directivity is so overwhelming at all levels of complexity that its denial seems inconceivable.

De Beer writes²: "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 the tendon lie accurately along the line of strain between the 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, and when in phylogeny there is a change in the nerve fibres from which any given nerve-centre habitually receives its impulses, the nerve-centre is found to be situated near its new source of stimulation."

Bierens de Haan³ writes: "... that 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 larvae, are facts that are so self-evident that it is not necessary further to elucidate them."

The evidence that is occasionally mustered to oppose the notion of directivity consists of examples of the behaviour of systems ostensibly contrary to their personal interests, but that, if examined more closely, are seen to be in the interest of the more general system of which they are part. *Indeed, if the sub-system is regarded in vacuo, its behaviour may not appear directive. If it is regarded, as it should be, as a differentiated part of a larger and longer-term system, its directivity then becomes apparent.*

Thus, for instance, it is argued that during the mating season, the male stickleback undergoes colour changes that render him conspicuous and hence more vulnerable to predators.⁴ It has been shown that the object of the colour change is to attract the attention of females. That the stickleback has enemies who have learned to take advantage of this conspicuousness (as the predator's behaviour is also directive) is only to be expected and does not detract from the directive nature of its colour change for breeding purposes. The latter remains adaptive so long as the breeding advantages to be derived from it outweigh its disadvantages for the purposes of phylogeny.

An infinite number of examples of the same principle can be cited, thus: certain fish learn to tolerate smaller fish that enter their mouths and clean their teeth. This is known as "cleaning symbiosis". However, predators have "learned" to imitate these cleaners, and have grown to look exactly like them. They are consequently tolerated by the larger fish, a fact they take advantage

of by taking an occasional bite at their unsuspecting hosts.⁵ In many species of ants, specialised workers have evolved to look after the larvae. Certain cuckoo-like parasitic beetles, incapable of looking after their own larvae, lay their eggs in the ants' nests. These later hatch into larvae that are indistinguishable from the ants' and which, after having been carefully looked after by the workers, hatch into predator beetles that gradually take over the colony.^{6,8}

These are but two of an infinite number of examples of parasites that take advantage of certain features of a host's behaviour pattern. Does this mean that these features are not directive? Undoubtedly not. It is clear that cleaning symbiosis is very useful to the host; it is also clear that looking after the larvae is a necessary function within an ant colony and is directive to the survival of the young. The fact that, for these functions to occur successfully, a number of individual members of the species will fall prey to parasites is no argument against their usefulness.

Such behaviour only appears non-directive if we regard the individual *in vacuo*, i.e., apart from the family or the community of which he is part, which we know to be impossible.

Again, it is pointed out that the fierce competition obtaining in certain animal societies for the possession of the choicest female or of the most desirable territory is not conducive to the survival of the individual. Indeed, in such competitive societies as those of the baboons or fur-seals, casualties often can run quite high, especially under conditions of overcrowding.⁷ But such behaviour can only be interpreted as contributing to the selection of the fittest individuals and thus to the adaptation of the species as a whole to the challenges of its environment.

It is also occasionally pointed out that in certain species the individual at one or more stages during its life-cycle, is subjected to so many environmental challenges that its chances of survival are in fact minute. This is especially the case with certain parasites. Miriam Rothschild and Teresa Clay write: "... the eggs of the grouse roundworm lie scattered all over Scotland, but millions and millions of their young, which hatch out and wriggle up the sprigs of heather around them, perish because that particular plant is never eaten by a grouse. Similarly, vast numbers of

immature ticks cling hopefully to blades of grass, waiting for the millionth chance which will bring an animal brushing through the vegetation within reach of their waving forelegs.

Owing to the difficulty of finding a host—a difficulty which is superimposed on the more familiar hazards of life—the mortality among most parasites is enormous. A vast number of eggs or larvae have to be produced in order that the species can survive at all. Consequently, a characteristic feature of most parasites is a relatively enormous development of the reproductive organs, which frequently come to dominate the body. Intestinal worms produce eggs by the million and even brood-parasites like the cuckoo lay four to five times as many eggs as their hosts. The difficulty of host-finding can often be estimated by the number of eggs laid."

Surely nothing could be more directive than this automatic regulation of the number of eggs laid in accordance with the number required to produce the optimum number of adults. Once again, directivity is apparent if one realises that the unit of analysis must be the larger unit—in this case the species as a whole, four-dimensionally—and not the individual.

Other arguments against directivity are based on the disadvantages to individual survival of the so-called inflexibility of instinctive behaviour. Thus Hingston⁹ tells of a clubionide spider in Central India. These spiders live in grassy meadows. They are the same colour as the grass and are capable of lying in a particular position that enables them to blend perfectly with their background. When threatened, their instinct is to remain perfectly immobile and thus hope to pass unnoticed. Hingston found that, in such circumstances, there was no way to make them move, neither by pushing them with a straw, by sticking a pin into them, nor even by cutting off one of their legs. They would inevitably remain quite immobile.

Canis azarae, the pampas fox, apparently behaves in a similar way. Now, can one say that such behaviour is not directive? Undoubtedly not, statistically; therefore, from the point of view of the species, it must constitute the reaction most conducive to survival.

A further example is the phenomenon of blinking. The human eyelid closes to prevent a foreign particle from

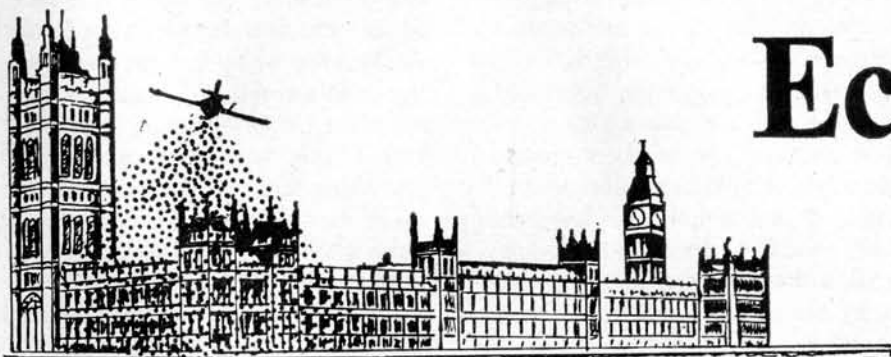
entering the eye. The performance of this task suffers from the same shortcomings as does the behaviour of the famous insectivorous plant, the *Dionaea* fly-trap. Neither system can distinguish between the various foreign particles, most of which are harmful, but some of which could conceivably be beneficial, such as the medicinal drops which an oculist may wish to insert into a diseased eye. Does this detract from the usefulness of the blinking function? The answer is no. The experience of phylogeny has established that, statistically, blinking, like digestion and the circulation of the blood, is best mediated at a low neurological level. The possibility that a foreign particle entering the eye might be beneficial is so remote that it is best not taken into account. The cost of doing so, in terms of an increase in the size of those cerebral mechanisms required for increasing discrimination, would just not be worthwhile.

Indeed, in spite of the inflated view we may have of human intelligence, it is probable that if this "faculty" were allowed to govern all those elaborate processes necessary to sustain life, which are at present mediated by lower centres in our brain and spinal cord, the result would undoubtedly be a serious increase in inefficiency. Blinking may appear indiscriminatory, but this lack of discrimination is a low price to pay for the advantages of automatism and for the protection it enjoys from the ravages of "intelligent" behaviour that is at present wreaking such irreparable damage to the less well-protected parts of our biosphere.

Edward Goldsmith

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Ecopolitics

by Robert Allen

Fresh air squandered

We all have a right to fresh air—like water it is something we take for granted—yet safeguarding it is increasingly difficult in an industrial society such as ours. Atmospheric pollutants must be kept below levels where they cause offence, damage health or disrupt ecosystems, and basically there are two ways of doing this: either by establishing maxima, enforceable through the law, with heavy penalties for infringement and an agency powerful enough to bring offenders to book; or by persuading polluters to gradually improve standards, prosecuting only those who prove entirely intractable.

In Britain we have taken the latter course, in the belief that “complicated legislation and standards usually require complicated and expensive means of supervision and inspection, with the danger that the system falls into disrepute when it cannot be enforced”¹. Grit and dust, and smoke from industry, private houses and vehicles are the concern of the local authorities under the Public Health Act, the Clean Air Acts and the Road Traffic Acts. Most other forms of industrial air pollution are the concern of the Alkali Inspectorate under the Alkali, etc Works Regulation Act of 1906. The Inspectorate’s job is to see that industry uses the “best practicable means” to keep emissions to the minimum, and it is this phrase which exposes the disadvantages of exhortation over legislation.

There is no doubt that in many cases the Alkali Act has worked well, and our anti-pollution policies are probably more effective than those of most other

countries. Nor is there any doubt that the Inspectorate’s policy of persuasion has earned the willing co-operation of many industries. The measure of control it has achieved is better than any legislation that is more honoured in the breach—but there is still no substitute for putting standards on the statute book and providing the means for enforcing them. For a policy of exhortation is always open to the charge that standards voluntarily come by, while better than nothing, are not nearly enough, and sometimes protect industry more than the public.

The case of RTZ’s aluminium smelter in Anglesey is a good example. At the public enquiry the Anglesey Residents’ Association (ARA) opposed the plan, largely on the grounds of air pollution. They were somewhat mollified, however, by RTZ’s assurance that they would keep emissions below certain levels. There is some dispute between the ARA on the one hand and RTZ and the Alkali Inspectorate on the other as to whether these assurances were guarantees or estimates “of what might be achieved on the evidence of known technology”. At all events, with the agreement of the Inspectorate, total emissions now exceed the levels mentioned at the enquiry by 54.7 per cent, while gaseous emissions of fluorides from the main stack have trebled.

The Alkali Inspectorate in permitting this increase has taken cover behind an increase in stack height. Originally there were to have been two stacks—the main one of 300 ft and one for the anode plant of 125 ft. Now all emissions (except some from the potroom louveres) go through a single stack of 400 ft.

Thus in one letter to a local complainant, the Chief Inspector writes: “The important point, which you seem to miss, is that it is the effect of the emissions at ground level which matters most and not the mass emissions of pollutants. In this our requirements have not changed and the environment is safeguarded just as much under the new conditions as under the old, perhaps even with a minor improvement”. The important point which the Chief Inspector misses, of course, is that putting greater quantities through a taller chimney does not make things easier: the stuff comes down again and is merely dispersed over a wider area. It may be more democratic but it is still as anti-social. Indeed, in this particular case it is less democratic since fewer pollutants will fall on company land while more will fall on the residents and farmland surrounding it.

A reasonable man might assume that the increase in emissions has been allowed because no technology exists to reduce them. He might also assume that the levels discussed at the enquiry (whether guarantees or estimates) were chosen because they represented a sober assessment of what was safe in terms of the health of the local population and damage to the environment generally. So he would expect a very good reason indeed for exceeding those levels. I understand, however, that the standards proposed at the enquiry can be met but that it would cost an extra £500,000—a sum which might be beyond the means of a rag-and-bone man but not, presumably, of RTZ. Further, if the industry were already established, it might require time or a subsidy to install the necessary equipment, but a

brand new one like the smelter should have protection of health and environment written into the initial capital outlay.

The argument hinges on the interpretation of "best practicable means". As understood by the Beaver Committee on Air Pollution, who had nothing but praise for the Inspectorate, the expression "covers both the right type of plant and its use and maintenance. For certain processes upper limits are specified by the Acts for the concentration of acidity in the effluent gases which may be discharged to the air. *Wherever it is technically possible complete elimination is required*" (italics mine).² In other words there is room for manoeuvre only in what techniques are used to eliminate pollution.

Today however, the common interpretation introduces an important economic qualification. Here, for example, is the view of the Warren Spring Laboratory: "'Best practicable means' is interpreted as the provision, efficient maintenance and proper use of appliances for preventing the escape of gases, smoke, grit and dust into the atmosphere and for rendering them harmless and inoffensive where discharged and the proper supervision of operations causing such emissions. *It also takes into account the effect of such measures on the operation of the process and their cost*, since a balance has to be preserved between the amount of money to be spent and the degree of harm or nuisance involved" (italics mine).³ In other words muck will be reduced if the brass does not suffer overmuch.

The Chief Inspector of Alkali seemed to concede that "best practicable means" are now interpreted in economic rather than technical terms when he wrote in his Report for 1969: "The problems of air pollution control are mainly economic. If money were no object there would be very few unresolved problems, for the technical solutions to prevention are almost all known"; and "Our present knowledge of emission control techniques is sufficient to give this country a clean and healthy environment, provided that sufficient energy and resources are devoted to the task. We know how to prevent smoke formation, arrest grit, dust and fumes, absorb noxious or offensive process gases and desulphurise liquid and gaseous fuels. The chief reason why we still tolerate a degree of

pollution is economic and it is important that the financial resources available should be directed primarily towards abatement in the correct order of priority".⁴

There are two issues involved. One is that as a society if we are capable of creating a clean and healthy environment there is no question we should do so. This does not mean that industry must eliminate emissions immediately regardless of cost. But it does mean that standards and a time-table for meeting them should be fixed without delay—in short the dates and targets promised us by the Conservative Party election manifesto.

The other is that the Alkali Inspectorate is in no position to decide economic priorities. Not only are the tools for the job inadequate (cost benefit analysis is still in its infancy and has so far proved a singularly clumsy method of quantifying needs like clean air), but the Inspectorate is required by the Act to consider only the technology of control—indeed that is where its expertise lies.

The great danger of allowing economic factors to colour technical judgments is that an industry's arguments against incurring cleaning costs appear much more "reasonable", not to say forceful, than the demands of those who have to breathe the air it pollutes. This is vividly illustrated by the Port Tennant carbon black affair.

For 21 years the residents of Port Tennant, Swansea, have suffered from vast quantities of smuts emitted by a factory of United Carbon Black Ltd. The filth is appalling. "Windows and washing are all marked by the carbon", said one resident, Mr Edgar Cutler. "If I want a clean shirt my wife has to take it to the launderette to get it dry... My wife and I have to scrub our carpets once every eight weeks and we have to redecorate three or four times for every once that other people have to do it". Another resident, Mrs Jessie Cottle, said: "I suffer from asthma and the air is seriously affecting my health. I cannot even open my bedroom window at night". Some of the mothers claimed their children got so dirty they had to scrub them with detergents.

They complained bitterly to both works management and the local authorities to no avail. Then in January 1970 they heard the factory planned to increase production by 35 per cent. They blockaded the entrance for

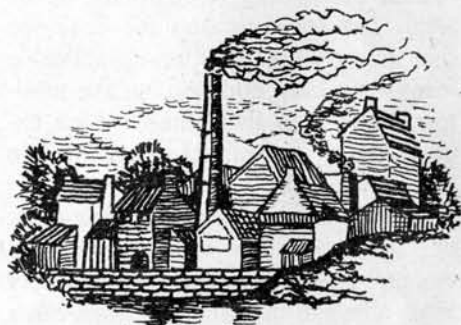
a day and took their soiled washing down to the Guildhall in an attempt to impress their plight on their local councillors and MP. There was no improvement, and in February this year the housewives blockaded the factory again—this time day and night for three weeks, after which they secured a meeting with an Alkali Inspector and an Assistant Under Secretary at the Welsh Office. They have been promised that something will be done, but they have taken care to warn the company that more direct action will be taken if nothing happens within six months.

For anyone with a feeling for justice it is inconceivable that the people of Port Tennant should have had to suffer for so long. Yet nothing was done because United Carbon Black Ltd could hold up their heads and say, we have done all we are required to do by the Alkali Inspectorate.

"Astronomical figures are frequently quoted for the cost of the effects of air pollution", writes the Chief Inspector of Alkali, "but we see no rush by the alleged sufferers to finance the prevention of pollution at source when on the face of it, there should be a phenomenal return for the outlay".⁵ In the cases of Anglesey's aluminium smelter and Swansea's carbon black works the costs are gross environmental contamination and simple human misery. The sources themselves are quite capable of meeting them. It is surely time they did so.

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5. Chief Inspector of Alkali, 1970, *op. cit.*, p. 5.



Feedback

1 Epping Forest reprieved

The threat that cattle should not be allowed to range freely in Epping Forest has been lifted—at least for the time being. Mr D. L. Jones, reporting on a meeting between the Corporation of London, as conservators of the Forest, and local authorities, said that “the Corporation is not prepared to promote legislation unless it has the support of all local authorities and it was clear that they are by no means unanimous”. Epping and Ongar RDC had reiterated its opposition to legislation.

Gazette and Guardian, 30.4.71

2 Fowl pest

Fowl pest, which has killed over 15 million chickens in the past seven months, is being spread unwittingly by the public. Broiler chickens infected with the disease are taken to processing factories and later sold in the normal way, says Capt. S. E. Thistlewayte, chairman of the National Egg Producer Retailers' Association. “The disease cannot be passed on to whoever eats the chicken, but it will still be in the carcase when it is thrown away and can spread again. We shall never get rid of this disease while this sort of thing goes on. We know of broiler chickens dying on their feet while waiting in lorries outside processing factories.”

Daily Telegraph, 5.4.71

3 If you go down to the woods

The Forestry Commission is to spend £100,000 a year on car parks, camp sites, forest trails and other ways of making its 3 million acres more attractive to visitors. Last summer it established a conservation and recreation branch, for which it hopes to get a Treasury grant. There are already 177 picnic sites, 201 forest trails, 134 car parks, 16 information

centres, 36 youth club sites, and nine camp sites with a total capacity of 3,000 tents and caravans.

The Commission hopes to attract private capital for some of its more ambitious projects like log cabin retreats. Announcing these plans, the chairman Lord Taylor of Gryfe said: “2,000 people in a forest area of 2,000 acres can be lost and all of them can enjoy some degree of privacy. People want to escape into peace and quiet and we will cater for these in our forests.”

Guardian, 6.4.71

4 Supersonic white elephant

Mr F. R. Barratt, Under Secretary of the Defence, Policy and Materials Division at the Treasury has told the Commons Trade and Industry sub-committee that there is no hope of fully recovering Concorde's research and development costs—£825 million at the latest estimate (the UK's share being £405 million, of which we have spent £250 million). Mr Barratt added that it was uncertain how much of this money would be recoverable, and said that if Concorde was proceeded with there would be a substantial loss. This was a certainty and had been known for some time.(1)

Meanwhile, figures have been submitted to the Cabinet, suggesting that the number of Concords likely to be sold is between 20 and 40—much less than the manufacturers' estimates of 250.(2) This lends some point to the protestations of the Concorde lobby that the plane will have no adverse effects on the environment. Most environmentalists have argued that while a few SSTs might make no difference, no one can predict the potentially grave effects of many hundreds of them in the air.(3)

Even fewer will be ordered if American moves to ban Concorde on noise grounds are successful. 21 of the 51 states have Bills to this end before

their legislatures. In Massachusetts one such measure has been passed by the Senate, and one in New York is also likely to go through. In the US Congress, however, a Bill sponsored by Senator Gaylord Nelson which would ban foreign SSTs has been held up in the commerce committee and could well die there.(2, 4)

The Weekly magazine *L'Express* has carried out a survey of French public opinion, and found that it has veered markedly against Concorde. Only 44 per cent believe the Government was right to have started the project, as against 72 per cent in 1969; 58 per cent, however, believe it is too late to cancel it.(5)

At home, the Government wallows in expensive uncertainty. The decision on full production has been postponed, but four more aircraft and materials for another six have been ordered. Expenditure at the rate of £1 million a week is being allowed to continue, and as the weeks go by so will it be more difficult to cancel Concorde. A proposal that the Government should own the aircraft and lease them to BOAC has been considered by the Cabinet.(2)

(1) *Financial Times*, 21.4.71; (2) *Observer*, 25.4.71; (3) editorial interpolation; (4) *Guardian*, 13.4.71; (5) *Financial Times*, 5.4.71

5 Abortion pill

Prostaglandin, an abortion-inducing drug, is being tested in four hospitals, so far with success. At the moment it must be injected, but it is believed it could be made available in tablet form. However, Sir John Peel, former President of the Royal College of Obstetricians and Gynaecologists, has said that at least five more years of testing and research are necessary, and warns that “if it does away with surgical abortion, its implications will be tremendous and decisions about its

use will have to be taken at the highest level. It could be a political matter requiring a change in legislation". *Daily Telegraph*, 5.4.71

6 Where there's muck—hang on to your brass!

J. Whelan and Sons, industrial tank-cleaning specialists of Hockley, Birmingham, have been fined £60 plus an analyst's fee of £20 for polluting a sewer by pouring large quantities of acid down a drain.

It took the city corporation three months and £1,000 to track them down. *The Times*, 17.4.71

7 Playing with fire

The US Atomic Energy Commission plans a 5,000 megaton nuclear explosion 6,000 ft below the surface of Amchitka Island, about 1,400 miles south-west of Anchorage, Alaska. Canada has expressed "serious concern" to the State Department, and warned that since the test is to take place "in a region known to be prone to earth disturbances" it could have grave environmental consequences. The test is scheduled for October.

Daily Telegraph, 14.4.71

8 Taxonomical teaser

Mrs Mary Whitehouse has attacked Dr Martin Cole's controversial sex education film as reducing humans "to the level of animals..."

Daily Telegraph, 17.4.71

9 DoE gives with one hand . . .

Mr John Peyton, Minister of Transport Industries, has announced that the Government will help local authorities introduce bus priority schemes. Provided the authority takes the initiative and spends £5,000 or more on the scheme, the Government will give 50 per cent on the cost of roadworks and traffic signs; principal road schemes will get 75 per cent.

Financial Times, 27.4.71

10 . . . and takes with the other

At the annual dinner of the Freight Transport Association, Mr Peyton said that the Government's decision to restrict maximum lorry weights to the present 32 tons was justified by "the tide of opinion that is at long last beginning to favour the imposition of

some kind of control over at least some of those things which tend to make modern life hideous".

However he went on to say: "I hope that, as we get nearer to a comprehensive network of good roads—a network that will provide good access to the ports—it might be possible to relax the rules as to weight, and at the same time restrict these heavier vehicles to those roads which can accommodate them. This is a matter on which I would wish to hold detailed consultation with you. I would like to stress the importance I attach to easy access to the ports."(1)

The drive for a comprehensive network of good roads is causing a great deal of trouble and concern in, among other places, Cambridge, Cumberland and Hampshire. Noise from the proposed six-lane Cambridge western by-pass, a 14 mile extension of the M11, is likely to ruin Granchester, the village which inspired Rupert Brooke, say objectors.(2)

The Department of the Environment supported by Cumberland County Council, has proposed a road "improvement" scheme through the heart of the Lake District National Park along the shores of Bassenthwaite. The Lake District Planning Board, who strongly oppose the scheme, wants the trunk-route to go to the north of the Park. Mr Graham Watson, its chairman, has described the two interchanges planned for the outskirts of Keswick as "two vast plates of spaghetti linked by a swath of roads cutting across the foothills of Latrigg".(3)

The DoE has been especially heavy-handed over the M27 motorway, which is to pass close to the village of Rownhams (pop. 600) between Southampton and Winchester—so close that some houses will be demolished, others will be a mere 20 ft away, while a further 17 will be stranded on the wrong side of it. The villagers want the route to be moved half a mile to the north, but the DoE regrets that this will be too difficult and expensive.

Instead they have decided to put a service area astride the motorway a bare 100 yards from the eastern end of the village. This will boast a petrol station with breakdown facilities, restaurants and snack bars, 24 ft high road lights—and, especially during the summer months, will no doubt be a hullabaloo of transistor radios and

chattering motorists. As Mr Jack Parker, chairman of Rownham's residents' association, puts it, the villagers who live there for the peace and quiet "might just as well take up residence at Waterloo Station".(4)

Somewhere in the DoE there must be a file marked "environmental quality", and somehow the ghost of the Ministry of Transport has hidden it. (1) *The Times*, 27.4.71; (2) *Daily Telegraph*, 27.4.71; (3) *Guardian*, 7.4.71; (4) *The Times*, 27.4.71

11 Energy restraint plea

Worried by an anticipated 450 per cent increase in power consumption by 1990, New York's Environmental Protection Administration has urged severe measures to limit the use of electricity. If power output continues to increase at the present rate, it says, there will be "an intolerable increase in air pollution, chronic respiratory disease, thermal pollution, radiation hazard and ruination of landscape".

Daily Telegraph, 21.4.71

12 Till kill

Hedgehogs, rats, birds, ducks and thousands of fish have been killed by a chemical polluting the River Till in Lincolnshire. All wildlife has died on a five mile stretch of the river. The Lincolnshire River Authority has not yet discovered the sources of the pollution, though it knows it entered the river near the village of Ingham. A chemical packaging company at Ingham, Britpak Ltd., is quite sure it is not responsible for the episode. Mr C. J. Elcoate the managing director says, "we do handle all sorts of herbicides, insecticides and fertilisers, which come in bulk for us to package. But we are one and a half miles from the river Till, and connected by only a small stream. We are extremely careful about handling chemicals and consider that an enormous amount of chemical would have to go down to do this damage". *Sunday Times*, 4.3.71

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Ecotechnics

by Arthur J. Puffett

Bricks from—anything !

When a manufacturing process uses waste materials as the basic ingredient, ecologists applaud the achievement. If the same process can also significantly reduce the manufacturing costs over the conventional method, economists also begin to take notice.

T-A Materials, Inc., of Palisades Park, New Jersey, was founded in 1969 to manufacture bricks, blocks and tiles using a revolutionary system called the "Tech Process". The company devised a method whereby almost any inorganic mineral or mineral waste could be used to produce bricks to high tolerances, at a low unit cost and with a low capital investment. The ecological potential at its inception was hardly realised, but an article in a leading American business magazine resulted in a deluge of mail, pointing out the vast resources of waste which could be used at negligible cost. Indeed, many producers of industrial waste would welcome the opportunity of ridding themselves of their technological "garbage".

This unexpected development led T-A Materials to begin experiments on a host of differing materials, including: fly ash, garbage frit, ground glass, mine and quarry tailings, cement dust and furnace slag. Having reached the stage of proven commercial production, the company now offers producers, contractors and architects an economical method for mass producing masonry products designed to counteract the spiraling costs of materials and construction. For masonry producers, it means the utilisation of inexpensive and readily available raw materials. For contractors, it offers new low costs per thousand units, particularly significant in wall cost savings. For architects, it brings forth the hidden beauty of aggregate colour.

In simple terms, the Tech Process makes precision masonry units without the use of heat, unlike products using clay or sand-lime as the aggregate

which have to be "fired" in a kiln. Bricks made by the Tech Process (Tekbricks) are uniform in size, whereas conventional bricks can become distorted as a result of firing. Precision tolerances are obtained on masonry products, allowing rows of Tech products to be rapidly glued in place using thin line epoxy adhesives, apart from the normal method of using mortar to bond the rows.

The basic manufacturing technique consists of dry-mixing cement and aggregate to a specific formula, dependent upon the waste material being used and the strength of the final product. Water, and a special chemical accelerator, are then added in exacting amounts, binding the aggregate particles together. Depending on the material used, the aggregate makes up from 90 per cent to 96 per cent of the total solids. The material is then fed to a powerful press, moulded, discharged and stacked on pallets for a minimum of 24 hours to allow for drying.

However, independent laboratory tests indicate that a Tech Process product can meet or exceed American Society for Testing Materials standards for severe weather conditions. Load bearing block for reinforced masonry work can also be produced by the Tech Process.

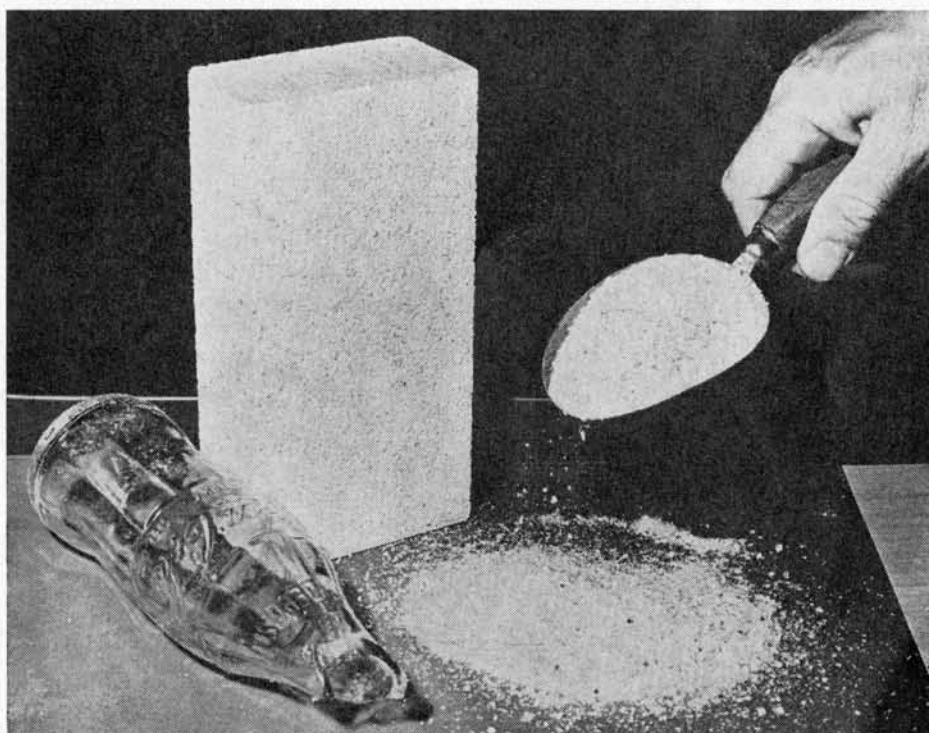
Tech products have the appearance and colour of the aggregate used. This allows for a most attractive, textured surface, with the natural colour advantages of the raw material being used. The process lends itself to blending of

different materials. Coloured chips may be added, and permanent but inexpensive mineral pigments can give innumerable pastel shades. Colour pigments disperse uniformly through the entire body of the masonry unit without shading or fading.

T-A Materials does not presently engage in the manufacture of masonry products through plants of its own. The company will license the Tech Process throughout the world, offering a complete service in the process and use of new materials, and offering engineering and purchasing assistance in construction and equipment installation throughout the period of contract.

Having read the details, stop and think! The argument between the China Clay companies and the transport authorities could cease if a plant were built in Cornwall. And imagine the difference in the landscape of parts of Wales, Lancashire and Yorkshire without the coal tips. Large municipal incinerators would have an outlet for their garbage frit, power stations for their fly ash and steelworks for their slag. The reduction in use of clay bricks would slow down the erosion of the countryside through open mining. The list is endless, the benefits spectacular.

So why can't a few local authorities, with grants from the government, set up a plant to rid themselves of their polluted past, at the same time bringing employment and money to their respective areas? The economics are right, the product is right, the cause is right—there are no further excuses.





Cures for technomania

APPROACHING THE BENIGN ENVIRONMENT, ed. Taylor Littleton, Collier Books, 45p.

THE ENVIRONMENTAL HANDBOOK, ed. John Barr, Ballantine Books, 40p.

POPULATION, EVOLUTION AND BIRTH CONTROL, ed. Garrett Hardin, W. H. Freeman and Co., 135p.

By now, it is painfully obvious that one of the prime causes of the coming ecological disaster is *technomania*. Our very conception of progress, with its twin exhortations of MORE and FASTER is rapidly destroying the ecosystem of the planet, and with it the probability of human survival beyond the year 2000. Or, as Konrad Lorenz put it, in a different context: "Just as there are lethal mutations, so there can be lethal cultures." Technomania is one of these.

Like any religion, it has its prophets. Watt, Edison and Ford, to say nothing of the heads of all "science-based" industries, can be termed orthodox. They have seen no faults, in innumerable after-dinner speeches, in the idea that uncontrolled technological growth is an absolute and unmitigated boon. This convenient, self-serving attitude is rapidly becoming untenable in the light of such idiocies as Concorde, the conquest of our land by the automobile, and the slow but definite poisoning of fresh and sea water with pesticides and other chemicals.

To combat the embryonic ecological movement which, more than anything else, represents an attack on technomania, the creed has begun to advance views which are, at first sight, heretical. But in fact these sheep in wolves' clothing are nothing of the sort. While advocating minor, irrelevant reforms, they would keep the economic, political and

social structures on which technomania depends intact.

Listen, for example, to the blurb on the cover of *Approaching The Benign Environment*. "In the recent floodtide of doomful prophecies about the imminent destruction of our environment, this book stands virtually alone. The three eminent scientists who wrote it offer hope—and more than that: positive creative ideas that can enable man to improve life on this planet and build what Dr James Killian, Jr. calls 'the benign environment'."

Dr Killian's history is at least as interesting as what he has to say. He is truly a high priest of technomania. As President of the Massachusetts Institute of Technology he was overseer of the enormous Lincoln labs, where the development of most of the American missile projects took place. Later, as special assistant on science and technology to Eisenhower, he OK'd the massive roadbuilding campaign which redesigned America's cities for cars at the expense of making them almost impossible to live in. One can only speculate about his later activities as chairman of Kennedy's Foreign Intelligence Advisory Board, but it is clear that he must have had a hand in adapting technology to the demands of "counterinsurgency". (Counterinsurgency is the Kennedy name for the ruthless suppression of agrarian reform movements throughout the underdeveloped world for the benefit of American investors.

And what does he say? The very phrase "benign environment" provides a clue, amounting to doublespeak. It is not the environment that is malignant or otherwise, but what man has done to it. What Dr Killian's sort of man, in particular, has done. Small wonder that he reassures us "... our society is confronted with a host of problems that in my view can best be solved by activists (sic) from the sciences... etc." His

view is tantamount to calling in an arsonist to rebuild the target of his crime. Small wonder that Dr Killian finds his solutions in terms of "bridging C. P. Snow's two cultures", and massive federal programmes.

Dr Walker's essay can be dismissed after reading but a single sentence: "... we have many very fine automobiles, very fine airplanes and, in many places, very fine highways. But the average citizen can't get from one place to another rapidly and safely." In other words, this is, with minor exceptions, the best of all possible worlds. What problems exist can be dealt with through existing channels, as the money becomes available.

What both of these men are doing, primarily, is justifying the present economic (capitalist) set-up. For doing so they are handsomely rewarded. Bucky Fuller, whose essay takes up the majority of this book, is in a class of his own. He is original, in a delightful and naive way, and his history of design successes makes him worthy of our attention.

His thesis is that "extinction is a result of overspecialisation". He has attempted throughout his life to avoid being trapped into the human equivalent of a single ecological niche. In doing so he has had to face each problem, as it arose, without preconception. His view of the rise of industrialism, which makes up the majority of this essay, is that it was only possible because of the surplus profits of piracy. He cites the British East India Company as the greatest pirates of all time, and damns the majority of humanity—though only by implication—for putting up with the "brain slavery" that our civilisation is built on.

Unfortunately, when it comes to modern economics and politics, he is unable to apply the same toughness of mind. He admits that the present system of distribution of wealth between the rich and the starving coun-

tries is operated for the profit of the few, but believes that technology offers a way out. It's the same old line—MORE and FASTER, we'll get to utopia that way. This is all put so subtly that his arguments can be extremely seductive. But they rest on a fallacy: the power output required to build Fuller's utopia would melt the ice-caps and put most of the world's farmland under water, while probably making the atmosphere unbreathable.

All in all, each of these men shares in Dr Killian's misconception as to what the environment is about. Their message will provide ammunition for a variety of large-scale interests whose activities must be stopped if man is to outlive this century. This book will probably enjoy a huge sale among senior executives. If you want to understand the enemy, it is well worth reading. But don't be deceived.

The Environmental Handbook is an altered version of a Ballantine collection produced for the last US Earth Day. It is divided into a sequence of essays about what's going wrong with the environment, and an "action guide".

The first section has contributions from just about all the experts: Boulding, Calder, Mellanby, Frazer Darling, Dubos, and Paul Ehrlich. Very little, if any, of this material is original, but it is nice that someone has taken the trouble to collect it all in one place. As an introduction to the subject, it is difficult to see how the collection could be bettered. However, there seems to be no over-riding scheme to relate one point of view to another.

Human ecology is still in an unformed state. It desperately needs a creed, an ideology, and a general matrix within which to discuss tactics—an alternative to technomania. It is pretty obvious that one or another of the by-products of technomania will make the planet uninhabitable within a relatively short time. Paul Ehrlich's "Eco-catastrophe" provides a well thought out example of this sort of scenario. How long do we have? What should we tackle first?—"The Death of the Oceans"? Concorde? Overpopulation? Non-returnable bottles?

Are these problems even separable?

It is questions of this sort that should be answerable by Human Ecology. Our movement has only limited energy and resources. We must allocate them

efficiently and realistically.

For example: if the time scale within which we are forced to operate is less than 50 years, it is unlikely that an educational reform working through the established school system would be appropriate. Perhaps the techniques of mass-education used in the Chinese cultural revolution, or the Cuban campaign to stamp out illiteracy would be more effective.

For example: the amount of pesticide already released into the environment will, when it is dispersed throughout the biosphere, be sufficient to cause major changes. Further production of nondegradable pesticides must be stopped *right now*. The agrochemical industry has enormous economic vested interests. It will drag its heels, gaining time to exhaust present stocks or recoup on present investment. Every two years they are able to continue reduces our chances—at a guess—by 50 per cent. Should we blow up the factories? Or should the government simply accept the impossibility of the situation and buy up the firms or compensate them for losses as a result of an enforced ban? (The last idea seems unfair to the public, but it may be necessary to bribe shareholders for the sake of all our children.)

The basic principles of Human Ecology must be stated in terms of the real situation. That means giving up a tremendous number of preconceptions, technomania among them. But first we must identify them. The essay section of this book tries so hard for universal appeal that it fails to take a critical viewpoint. Are local amenity societies really working? In all probability, they consume more trees through their paperwork than they save in their actions. And that—other than its educative function—is of less value than doing nothing.

We are not going to save the planet by planting flowers around factories and on slagheaps. That is not to say that I prefer slagheaps to gardens; simply that if we operate at that level, we will not in any measure increase the survival chances for our children.

The idea, presumably, of collecting a series of short articles is to promote this kind of debate. If the Handbook does nothing else, it will have achieved a tremendous amount. But the action guide is also useful. It contains a list of all the major legislation on the environment, a directory of organisations, and

a sampler of their viewpoints, which may help convinced readers to decide between alternative groups.

One point, however, disturbed me. If, as I am certain, the problems are mainly social and economic, the most important group is those who have the least vested interest in the established order. That is to say, the young and the poor. This book has a middle-class, middle-aged bias which becomes slightly patronising when it talks (down) to "the masses". It is very hard to imagine a mass movement of school-children and university students allied to young workers operating through, say, CoEnCo. Until ecology comes down to the level of everyday experience and relies less on poetic allusion and more on popular culture, this gap shows no signs of being bridged.

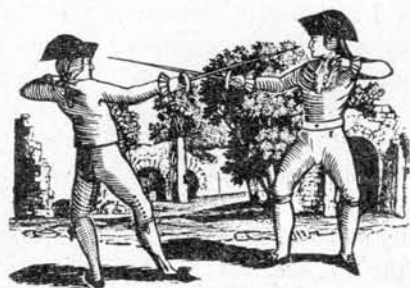
Garrett Hardin calls his book "a collage of controversial ideas". Like *The Environmental Handbook*, it is a collection of essays; but these come from sources as diverse as Marx, Darwin, the Bible and even Norman St John Stevas MP. The idea is that "a study of the history of opinion is a necessary preliminary to the emancipation of the mind".

Dr Hardin is concerned with our ideas about population, about the value and desirability of having children, and of using contraceptives and social policies to regulate population growth. Historically, this is bound up with Poor Laws, Victorian capitalism, and Puritan morality. By allowing social philosophers to speak for themselves, (with appropriate comments and background from the editor), he shows us that what we feel is the product of our upbringing. More important, by not pushing any one "line" too hard, he opens our eyes to the fact that the whole set of customs and taboos associated with western family life and the implicit population policy they embody is not the only one we could have.

One of the things that has been seriously lacking in the conservation movement is an historical perspective. Malthus, Darwin, Sanger and Marx have all played a part in shaping our world view, and yet we know so little of them. If *Population, Evolution and Birth Control* stimulates a few people to look at the original sources, it will have done well. And for those who have not the time or inclination, his selection is at least a good beginning.

Francis Arnold

Letters



A Conservation Party?

Sir,

Michael Gurstein's article on Environmental Politics (Vol. 1, 10) was interesting but inconclusive. It is certain though, that any type of "Conservation Party" would be doomed to failure by the unfairness of our present voting system and the unpopularity it would receive from all those short-sighted people who do not want prices to go up. Real concern for our environment would have to be paid for.

Pressure on the Government does work and the balance is beginning to tip our way. We should all maintain this pressure on our MP and the Press. As far as actual politics is concerned we should join the Party of our choice and work actively within it. As the writer implies, the Liberal Party is the most democratically organised and therefore the most easily influenced if joined in large enough numbers. It is also the one with the strongest regard for the value of human life, freedom and the rights of the individual. It does have policies on these vital issues.

Political parties are what we make them. If people who had firm views on any matter did something to further their point, instead of apathetically doing nothing positive and grumbling when things go against them, I feel our society would be much further forward in this country than it is.

Yours sincerely,

Hugh Heywood.

46, Robinson Road,
Mapperley, Nottingham.

Wasting Resources

Sir,

Mark Steinhardt (Vol. 1, 8, p. 32) is to be congratulated on his awareness of a major problem affecting the future

of our environment, that of wasting our resources. This includes not only the litter caused by unnecessary packaging but also the waste caused by unnecessary use. Fossil fuels go into the making of paper and plastics and they are also used in unnecessary illumination of advertising. Not only is imported wood used in paper but also the finest quality of China clay from Cornwall and Devon. None of these resources are in unlimited supply; moreover the misuse of some may increase our balance of payments problem and so affect our standard of living.

Perhaps someone will undertake the necessary investigation to show the cost of waste—as is imported and misused: how much wood pulp, tin, iron ore and petroleum are imported, only to be deposited as unwanted packaging.

Yours sincerely,

P. J. T. Barbary.

12, Ragstone Road, Slough, Bucks.

Biocontrol

Sir,

David Greenstock's article "Biocontrol in agriculture: 2" (Vol. 1, 10) raised one of the most fascinating controversies of ecology, namely, the mechanism of population regulation. He says that "certain field experiments seem to have established that there is a natural mechanism that regulates the population of any species to a constant density, regardless of fluctuations in food supply". Presumably, Mr Greenstock is referring to factors such as stress and competition for breeding area, which have been investigated by Errington and Wynne-Edwards respectively. Such evidence is limited and to say such factors can be applied to "any species" is mere conjecture. Moreover, Wynne-Edwards (1965) himself has said "Darwin was undoubtedly right in concluding that food is the factor that normally puts an extreme limit on population density".

Having said that "there is no need for us to take sides in this argument" Mr Greenstock continues to elaborate on his particular viewpoint by stressing the importance of climate in population dynamics. Even the leading advocate of the effects of climate on population has said that "it is not contended that the numbers of all animals are determined primarily by weather nor that weather

is more important than other components of environment" (Birch, 1957).

It is then claimed that "animals, birds, fish and insects all have built-in limitation mechanisms that tend to maintain a balance in the ecosystem and so ensure that food supplies are not exhausted". Some species do behave in this way under laboratory conditions. However, Huffacker (1958) showed that in a simple laboratory environment a population of the predatory mite *Typhlodromus occidentalis* would eradicate its prey *Eotetranychus sexmaculatus* and then die out itself. He had to provide a fascinating laboratory set up involving matchsticks, hairdriers and barriers of petroleum jelly before both species survived. A similar example of the lack of "built in limitation mechanisms" is the use of the predatory mite *Phytoseiulus riegeli* to control *Tetranychus urticae* the cucumber mite. The predator was so successful that it nearly wiped out the pest. The predator died out and the few remaining cucumber mites rapidly multiplied. One method of maintaining control was found by introducing small numbers of the pest at regular intervals! Try explaining that to a grower or farmer.

Yours sincerely,

Trevor H. Booth.

52 Dickens Lane, Poynton, Stockport.

Zinc in S. Wales

Sir,

A recent medical report stated that the concentration of zinc both in the body and in the air, was very high in the Risca—Newport area of South Wales. It has been suggested that the high illness rate in the area is due to this.

Just across the Severn estuary, zinc is being smelted in the Avonmouth area. Is it not possible that this is the source of the zinc pollution? If this is so, could I use your magazine to suggest that the connection between the two is investigated by a reputable scientific body? I believe farm animals are suffering and dying in the Avonmouth area. Do people have to die before something is done?

Yours sincerely,

John G. Owen.

94 Nantgarn Road,
Caerphilly, Glamorgan.

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