The
Ecologist

20p

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Vol. 1. No. 10 April 1971

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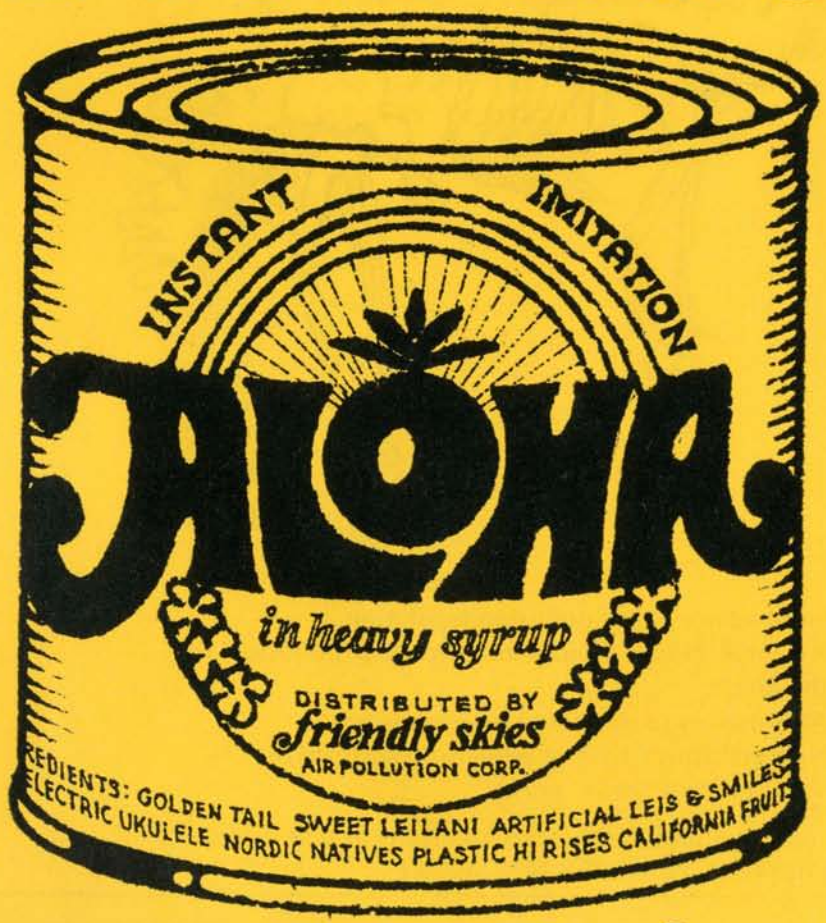

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Paradise lost?

by John Wehrheim

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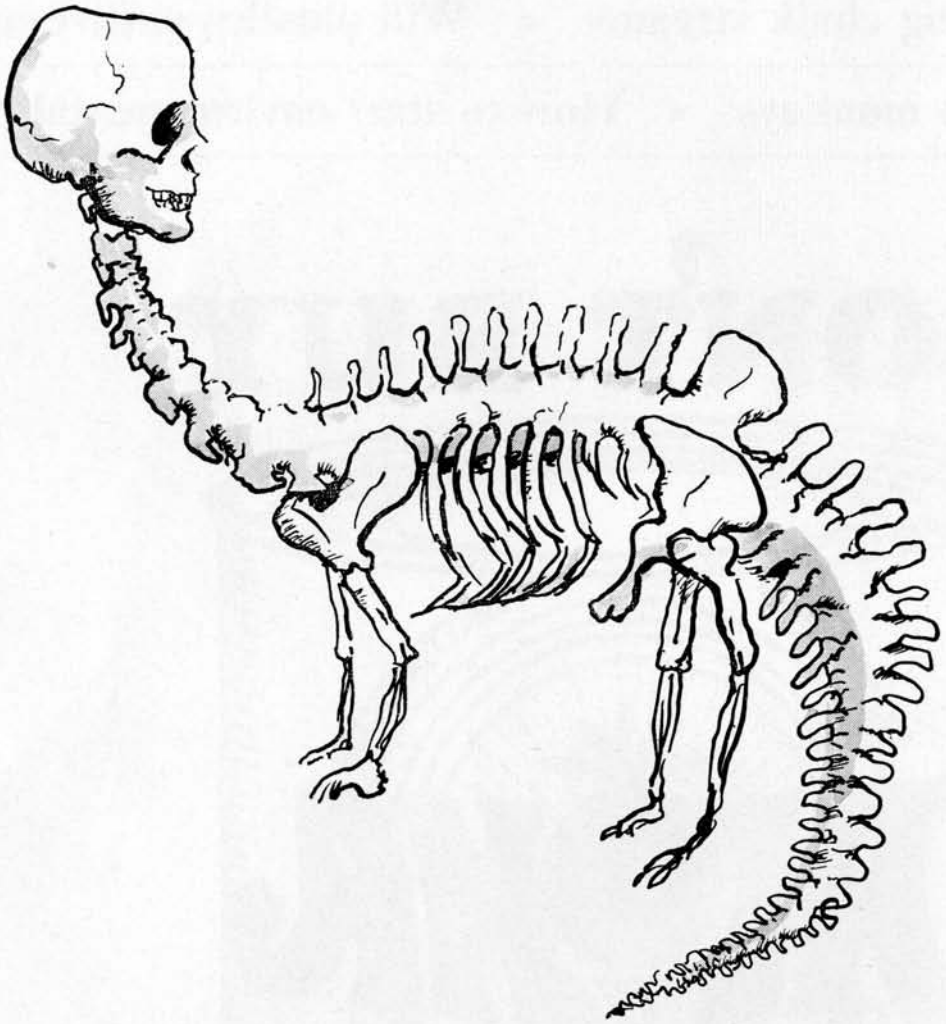

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The Ecologist

Vol. 1. No. 10 April 1971

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Published by Ecosystems Ltd., registered office 11 Mansfield Street, Portland Place, London W1M 0AH and distributed by the Hachette Group, Continental Publishers and Distributors Ltd., 4 Regent Place, London W1R 6BH; Telephone: 01-734 5259; Telegrams: Aglibrairi London W1; Telex: 25114. Subscriptions to: The Ecologist, 73 Kew Green, Richmond, Surrey. Printed by The Garden City Press Ltd., Pixmore Avenue, Letchworth, Hertfordshire, SG6 1JS.

"I said—another batch of tourists come to enjoy the glories of our island heritage"

Editorial

The relief of Heathrow

The great failing of the Roskill Commission, and it seems of the embattled residents of Cublington and Foulness, was that they left unquestioned the assumption that London needs a third airport. Indeed the controversy it generated remained a series of sterile chunterings until Anthony Crosland entered the fray. Addressing his Grimsby constituents, he pointed out that at none of the possible sites would a third runway be ready before 1995, and a fourth not until 2002—by when "predictions and projections become meaningless". He suggested the Government delay its decision while it studied the prospects of VTOL and STOL airliners, the speedy development of which could eliminate the need for a third airport altogether.

Sadly, Desmond Fennell, chairman of the Wing (Cublington) Airport Resistance Association, rejected this idea, stating that any delay would be "unacceptable". His Association had spent £55,000 on its campaign, and it wanted value for money—an immediate decision, no less, on anywhere so long as it wasn't Cublington. "This region is in a planning blight", he complained, though he did not say what alternative development he would wish on this quietly lovely area. "The proper answer," he added, "is to put the airport on the coast or at any suitable estuary site."

Derek Wood, chairman of the action committee against Foulness, naturally thought this a most improper answer. "Our coastline is as precious a heritage as our countryside," he said. And in the House of Lords, Lord Beswick argued that "to many people the opportunities for physical and spiritual refreshment are much greater on an estuary on the Essex coast than in the Vale of Aylesbury".

It was depressing to hear the residents of Cublington and Foulness working against each other, when they should have been joined in common cause. Both have a lot to lose, and as our island becomes increasingly overcrowded, each pretty village and every windswept mudflat grows in value—a qualitative value, likely to be ignored by such as Roskill's accountants, bemused by the treacherous simplicity of cost-benefit analysis.

Just how slippery are the paths down which cost-benefit can beguile the unwary, has been demonstrated by John Adams in a devastating essay in *Area*, the journal of the Institute of British Geographers. Using the same assumptions as Roskill's accountants, he shows that an airport could be placed very profitably in the middle of London. Although five square miles would have to be bought at a probable cost of £2,500 million, houses in another seven square miles insulated, and handsome compensation paid (£4,000 million)—the time saved by businessmen and tourists (valued at £3.5 an hour for the former and £0.40 for the latter) would easily offset it, amounting to £9,000 million over a 30 year period. Churches and historic buildings are valued on the basis of the insurance premiums paid on them, so that the removal of Westminster Abbey would be a matter of very little moment since it would be a hazard to low-flying aircraft and would be worth only £1.5 million!

There are strong environmental arguments against both Cublington and Foulness—and any inland or coastal site for that matter. Nobody wants to suffer the "Danteesque horror" (Lord Goodman's apt description) of an airport where they live. There is no reason why they should. Air travel is profitable for the airlines and convenient for their passengers, but rarely is it vital. It is not a necessity like food or shelter—or quiet. It should go without saying that a society's first task is to ensure its members' needs are satisfied, and leave the luxuries till later. A Government which puts the operating profits of airlines before a citizen's right to peace is failing in a fundamental duty. Yet ours positively obstructs our right even to protest effectively when that peace is shattered: under clauses 41 and 42 of the 1949 Civil Aviation Act the public is expressly disbarred from taking legal action for noise nuisance against airlines and airports.

The single forcible argument for a third airport (even one of only one runway) was advanced by Lord Sandford, Under-Secretary for the Environment. 2,250,000 people around Heathrow already suffer considerably from aircraft noise: "In the light of forecasts of traffic demands in the London area, even in the relatively short-term, is not deferment of action bound to lead to increasing pressures to make far greater use of the existing London airports?" But these demands cannot be satisfied indefinitely. Sooner or later, the growth of air traffic—and especially the noise it creates—must be stopped. It is totally weak-kneed to project current trends into the future and proclaim they cannot be changed. As a nation we can and must choose between creating a land which is worth living in, or devoting more and more of our diminishing resources to mere mobility. A first step should be to lower permitted noise levels, for only by doing so will the residents of Heathrow and Gatwick be relieved, without transferring this growing nuisance to some other part of the country. Of course it will make air travel more costly, but this is as sound a way as any of slowing the growth of a convenience which has become intolerably burdensome to people on the ground.

In the Lords' debate, the Leader of the House, Lord Jellicoe, said the Government would consider any of the sites examined by Roskill, a different one, or even "none at all". If the Government decides there should be no third airport, and brings in greater restrictions on noise, it will earn the gratitude of all who care for the quality of life and for common justice. And that's a lot of people.

Paradise lost?

by
John Wehrheim

Hawaii is the epitome of the tourist paradise, with its promise of blue skies, white sand, splendid scenery and a warm welcome from the islanders. Now this promise has been broken by greed and stupidity, so that air and water are befouled, flora and fauna endangered if not destroyed, and the welcome soured by an alien ethos of puritanism plus profit.

The pilot of a Honolulu-bound jetliner doesn't need to check his instruments or consult his navigator to know when his plane is nearing its destination—he can spot the murky grey-brown pall that hangs over the city while still miles out to sea. And looking down into the ocean he can see its natural blues and greens discoloured with erosion, industrial waste, and raw sewage.

Hawaii, and especially the state capital Honolulu, has a serious pollution problem and there doesn't appear to be much hope that the situation will get any better before it gets much worse. "The loveliest fleet of islands that lies anchored in any ocean," as Mark Twain described them, is in trouble.

And it was in the 19th century when Twain visited Hawaii that many of the seeds of today's problems began to take firm, deep root. Large segments of the Islands' land and most of the territory's trade had fallen under the controlling hands of a few families. Ironically, most of these men were descendants of the original New England missionaries, and gained legal title to much of Hawaii through family land grants and quick dealings with good-natured and unsuspecting natives whose culture placed little significance in the concept of private property.

Fences went up all over the islands. Huge sugar and pineapple plantations owned by these families monopolised the markets and gained economic and political control of Honolulu. The original missionaries introduced Western architecture to the island in the form of traditionally white, wooden-framed and steepled churches. Their descendents continued to bring Western architecture to Hawaii: refineries, canning plants and colonial mansions. What the missionaries' puritanical fire and brimstone preaching didn't destroy in the Hawaiians' lifestyle the economics of their children would. The ways of New England and its harsh people and climate prevailed over the easy natural ways of these tropical people. Smooth skinned, bare breasted women in colourful wrap-round skirts were shamed from their innocence into long dresses that covered them from neck to ankle. The tie replaced the lei, a sweet smelling string of tropical blossoms, as the proper neckwear for formal occasions. The new economics made retreat back into the old life impossible and the Hawaiians were forced into the factories or plantation fields to labour next to the Filipinos

and Chinese, imported as cheap labour. The needs of industry took priority over the needs of the people.

In 1930 these Hawaiian industrialists engaged a team of experts to determine the need for new high schools in the islands. The investigators decided that there was no such need since the young people were required to work in the cane fields. A common joke among the native Hawaiians these days is that the missionary families came to the islands to do good, and did well. Their lesson in private property is paid for bitterly and the pollution of their ancestral land has become a symbol of this lesson.

Land speculation gone mad

Hawaii has become a whore in the market place and her businessmen her pimps. The smallness of these beautiful islands, combined with the rapidly increasing population and booming tourist industry, has put land at a premium. As a result land speculation has gone wild. In the last five years, sections of prime land have changed hands several times and gone up 100 per cent in market value with no improvements made. The average Hawaiian finds it financially impossible to buy land or own a home. He must lease property, usually on short terms, from one of the huge corporations. Recently many of these families have been evicted to make way for resort hotels, highways, and high-cost housing construction.

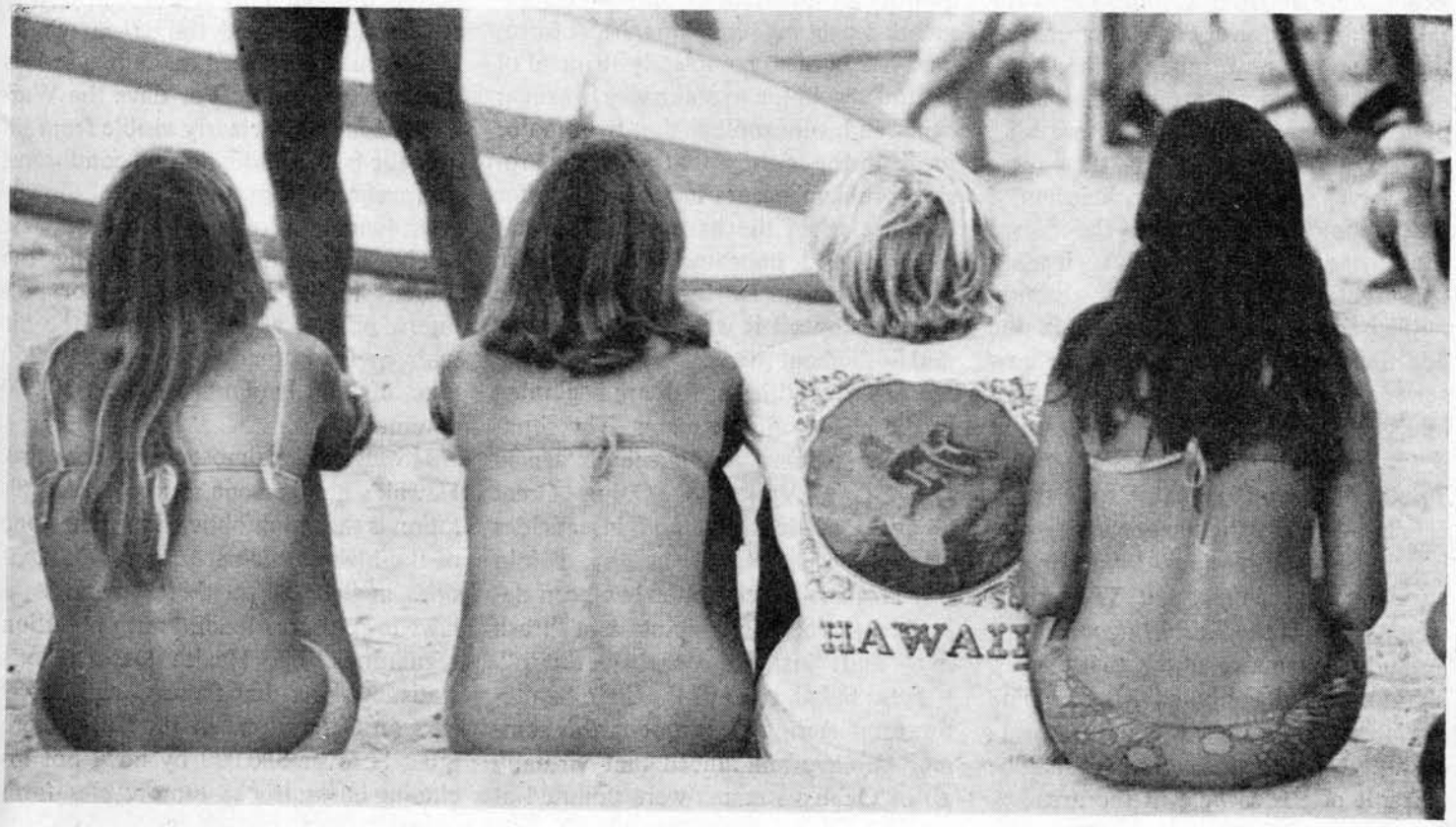
The effect of modern western technical society on the Hawaiian people has been disastrous. The crime rate is soaring. As it always has been near major military bases, prostitution is rampant. And the organised crime syndicate is doing big business. In the public schools the average middle class and middle American values are taught and the culture and traditions of the Hawaiians ignored. The children are forced to choose between the values of their parents and those of the school. The result is confusion and frustration.

The drop-out rate in Hawaii is one of the highest in the US and illiteracy is a major problem. Drugs are rampant in the high schools and junior high schools. Glue and paint sniffing are common and the use of a powerful barbiturate, seconal, nicknamed "reds" or "red devils", is reaching epidemic proportions. Even more alarming, heroin addiction is on the rise. The old missionary families, newly arrived mainland businessmen, and high ranking military personnel have built an extensive system of exclusive private schools to insulate their children from the failures of the public school system—a system built by the government that they dominate—but they can't insulate their children from their own corruptions, and drug usage has come to infect the children of both rich and poor.

Part of the reason for the growing intensity of Hawaii's problems is the rapidly increasing population—a staggering 500 per cent in the resident population since the turn of the century. But its concentration is even more responsible for Hawaii's social problems. 85 per cent of the state's 800,000 residents live on the island of Oahu, only third in size among the six major islands of the state, and the location of both Honolulu and Pearl Harbour. This gives the island 1,300 people per square mile—and the bulk of this crowd came after World War II. Compare that figure with the US average of 61 per square mile, take into account that a large portion of the island's area is uninhabitable, add that to the more than one million tourists yearly, and you have an idea of just how crowded it actually is here. The resident population is still growing at the rate of 1,000 per week with the tourist count increasing even more dramatically. Births are responsible for 20 per cent of the growth and immigration for the remainder.

Taxes and visas?

Many local people are up in arms over this trend. Suggestions have been made at Zero Population Growth meetings at the University of Hawaii, ranging from levying a heavy tax on tourism to seceding from the Union and issuing visas in order to regulate the flow of people from the Mainland. A proposal has been made to place a moratorium on the construction of tourist accommodation until the



State has built a system of public works and housing that can comfortably and efficiently handle the people they now have. Of course such proposals are opposed at every turn by big business.

Fifty-four million gallons of raw, untreated sewage are pumped into the ocean daily by the city of Honolulu. The outfall of the sewage is located 3,000 feet off Sand Island, about a mile from the beaches of Waikiki. According to a report made by Mr. Carey Fletcher, who is doing environmental research on a National Science Foundation grant at the University of Hawaii, in 1938 the research team of Metcalf and Eddy was hired to study the sanitation requirements of Honolulu prior to the construction of the city's present sewer system; and even then, based on the 1938 population, they recommended that a sewage treatment plant be built on Sand Island. Now, 32 years later with a population increase of over 300 per cent and growing at an alarming rate, the city still has not built a treatment plant. And although it has announced that it will soon, no plans for the system have been agreed upon.

The sea cannot hold out much longer. The volume of raw sewage could increase in the next few years to the point where Honolulu might be forced to close its beaches. The city's Offshore Pollution Study ten years ago disclosed that in 1959 coliform concentrations in the water between the famed Outrigger and Royal Hawaiian Hotels along Waikiki Beach were above maximum limits for safe swimming for about 10 per cent of the time. And now, much to the shock of tourists, incidents are being reported of toilet paper and human feces washing up on Waikiki Beach.

Robert Wenkam, former chairman of the Honolulu Chapter of the Sierra Club, one of the country's leading conservation organisations, recently publicised the increased danger of the additional millions of gallons of raw sewage that empties daily into Honolulu's offshore waters from a second sewage out-fall from Fort Shafter and Tripler Military Hospital. Exotic tropical diseases from Vietnam could by-pass hospital quarantine facilities and reach surfers and swimmers at Waikiki or water skiers in the Keehi Lagoon.

Studies have also shown that there is an increase of conjunctivitis or "pink eye" among surfers at Waikiki during onshore wind conditions, which may be a result of the sewage in the area.

This continual bombardment of sewage into the Island's waters has caused the growth of algae to skyrocket and, in turn, poses a serious threat to Hawaii's precious coral reef. Divers have already reported that vast expanses of coral off the Honolulu shore have been taken over and killed by algae.

Industrial pollution and erosion

But sewage isn't the only cause of pollution in Hawaiian waters. According to Carey Fletcher's report, "Honolulu Harbour is further polluted by the effluent from three pineapple canneries containing substantial quantities of oxygen-consuming materials; high temperature discharges from the Hawaiian Electrical Company's generating plant, the Honolulu Gas Company plant, and three canneries; sewage from ships; and storm drain run-off."

Fishermen have reported huge rafts of sugar cane pulp floating around the island's waters. The pulp is discharged from plantations at many coastal points, killing fish and making fishing impossible, tangling up propellers, clogging up water inlets, and producing a white, foul smelling film on the ocean's surface. The natural blue-green colour of the sea has been stained reddish-brown in many areas and the soil that is brought in with the sugar cane, washed off at the mill and then washed into the sea, is partly responsible.

But erosion accounts for most of this unslightly discolouration even though almost all plantations follow recommended contour ploughing. Most farmland has been so completely stripped of natural vegetation to make way for sugar cane and pineapples, the two major crops in the islands, that a serious erosion problem occurs immediately after harvests when the bare ground is left exposed and unprotected against the torrential rains. During the storms the rich red topsoil is washed into streams and flushed out to sea.

Large quantities of fish are beginning to die in Hawaiian streams. The situation has reached an alarming stage in the Palolo Valley of Oahu. Great amounts of detergent and insecticides have been measured in the Palolo Stream and its headwater has been described by local inhabitants as a "trash pile" and "just like a garbage dump".

Peter Sakai, chief of the State Sanitation Engineering Department, this summer publicly announced that virtually all of Oahu's streams were polluted at the lower levels and that parents should keep their children away from them.

Oil spillage has also become a serious threat to the islands' waters. Last spring for five consecutive days the swimmers and surfers at Waikiki Beach were forced from the water by an invasion of floating, tar-like blobs. They ranged in size from tennis balls to 50 lb hunks. The black goo stuck to skin, hair, bathing suits, surfboards—anything it touched. It was theorised that the substance was the result of oil pumped or spilled overboard from ships. The guilty source was never discovered.

Air pollution

Air pollution in Hawaii is also reaching alarming proportions and, as with water pollution, little or nothing is being done about it. The last State Legislature failed to pass a meaningful air pollution bill and, until quite recently, there has been little public concern.

Robert S. Nekomoto, chief of the air sanitation branch of Honolulu's Health Department, claims that many people of Hawaii have a naïve misconception about the smog situation here. "It's the myth of the prevailing winds or trade winds," he explained. "For years people have believed that these winds blow the air pollutants out to sea as fast as they were emitted into the atmosphere. But actually they blow in a clockwise direction most of the time and bring some of the pollution back with them."

Besides that, the winds can't always be relied upon. This September, during a week-long lull in the trade winds, Honolulu experienced an authentic Los Angeles type smog. For days the Waianae Mountains, clearly visible from all over the Island under normal conditions, disappeared from the view of downtown Honolulu, only a few miles away.

The big jetliners which bring the tourists to the Islands are major polluters, putting as much filth in the air with *each* of their approximately 250 take-offs and landings a day as 10,000 automobiles.

However, like almost everywhere else, Hawaii's number one source of air pollution is the automobile. Hawaii has one of the highest car-per-square mile densities in the US, yet there are no state laws to reinforce federal auto pollution regulations. The Health Department's statistics show that there were 273,559 cars on Oahu alone in 1966, and there must be over 300,000 by now, not including buses, trucks, motorcycles, farm

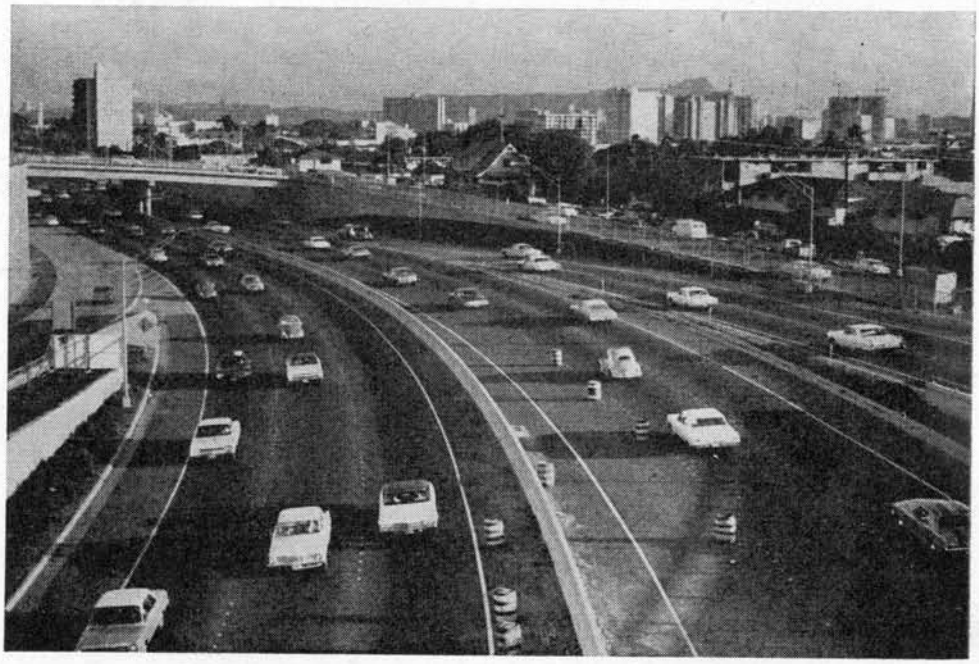
and construction machinery. Much of this is a by-product of the tourist industry in the form of booming resort hotel construction, thriving auto-rental agencies, and endless bus tours. And this transportation, most of which is heavily concentrated in the Honolulu area (and that can be verified by anyone who has inched his way through one of the rush-hour jams), spews 758.7 tons of pollutants into Hawaii's air every day.

Obviously the internal combustion engine must go, and preferably cars with it. Like so many other communities, Hawaii is fighting an impossible battle in trying to assimilate the automobile harmoniously into its environment.

The existing freeways in Hawaii were obsolete before their construction was complete, yet the state continues to build more of them. The best solution, not only in Hawaii but in every densely populated area, is clean, efficient, mass transit—and Hawaii is a natural place for such a system.

While the auto is the major cause of air pollution in the Islands and responsible for approximately 60 per cent of the filth in the atmosphere, industry is a close second. A typical 350 megawatt power plant like those used in Honolulu emits 75 tons of sulphur dioxide, 36 tons of nitrogen oxides, and five tons of particulates (smoke, dust etc.), per day. Sulphur dioxide is a mild respiratory irritant. However, combined with particulates and Hawaii's high humidity, it forms sulphuric acid which is four times more toxic and causes chronic respiratory diseases. This could in part account for the fact that Hawaii has the highest rate of respiratory illness in the nation and that this count is increasing rapidly. The emphysema and bronchitis death rates went up 128 per cent between 1962 and 1966. Mounting clinical and experimental evidence indicates that respiratory illness, and many of the diseases of our modern era, are a direct result of the abuse of the environment. Using the London Smog of 1952 as a model, scientists have formulated a quantitative theory based on cellular damage in the respiratory system to explain the increase in the mortality rate accompanying a severe air pollution episode.

While not nearly so critical to health, the open burning of garbage is certainly a visual if not olfactory pollutant. On just about any clear day a tourist can walk out onto Waikiki Beach and see the dense, billowing smoke rising



from the burning refuse at the Waipahu dump, located on the water's edge near Pearl Harbour. Each day the City refuse trucks and private garbage collectors cart some 300 tons of trash out to the dump. About 11 a.m. daily it is set afire and black clouds of smoke can be seen from Diamond Head to Barbers Point. The flaming rubbish is then bulldozed into the water where it sometimes drifts across the Harbour bringing burning debris to the doorsteps of the shoreline homes.

Gasoline sales "Top Secret"

The military is another major donator to Hawaiian pollution and though its contribution is easily visible in the air and water around Pearl Harbour, they like to think the whole thing is a military secret. Before World War II the waters of Pearl Harbour were crystal clear and rich with oyster beds. Now the water is a foul, oily brown and since 1962 the oyster beds in the Harbour have decreased 50 per cent as a result of the polluted water. And those oysters that have survived are too poisonous to eat raw. The State Department of Health attempted to investigate the situation but received no co-operation from the local military. Not only is the information on nerve gas, defoliants, germs, and the rest of the chemical warfare arsenal withheld as "classified information", but even the amount of gasoline sold at the PX is strictly TOP SECRET.

Herbicides and pesticides are another danger to life in Hawaii. The Health Department's Robert Kenomoto explained that the problem is much more critical here in the Islands than in non-tropical zones. Because of the continual growing season agriculturalists have to control bugs and weeds all year round. As a result Hawaii uses 50 per cent of the entire world production of one particular pesticide, 2-4D, and large amounts of DDT. The dangers involved in the use of DDT have been widely publicised but few people are aware of the possible threat of 2-4D. Although no positive proof has been made yet, the army has been ordered to stop using it in Vietnam because the medical authorities there strongly suspect that 2-4D is behind the sudden increase in birth defects.

Mammoth construction projects to provide high-cost housing for the influx of people have changed Honolulu drastically. New high-rise buildings transfigure this once breathtakingly beautiful horizon of verdant and bronze mountains, lush green palms, and sparkling blue ocean into just another predominantly vertical big city skyline. Diamond Head, the famous landmark visible from almost all over Honolulu five years ago, is now hidden by the maze.

The whole life chain of Hawaii is endangered by this thoughtless technological rape. When Captain Cook landed on Hawaii there were 70 species of birds and two of mammals native to the Islands. Today 24 of those species are extinct, 27 on the verge of extinction, and the mammals, the hoary bat and the monk seal, are considered endangered. Hawaii has lost more of its native bird life than any other area of the world and 20 per cent of the United States' list of jeopardised wildlife are Hawaiian species. Destruction of the natural environment is chiefly responsible for this slaughter. Yet filling, draining, cutting, covering and other drastic alterations of marshes, ponds and forests are allowed to continue to take their toll in the name of progress and profit.

But even though many species of wildlife are lost forever, the environment of Hawaii is "not yet at the point of no return", as one biologist put it. It can be saved if action is taken now, and a plan is drawn up according to sound ecological principles. Today's social and economic planning is not the answer, because an economic model represents only a small section of the environment: it takes into account only a fraction of the variables that an ecological planner would make use of. Our present economic design in Hawaii (as with most of the world) provides maximum despoliation of the environment for the maximum benefit of a very few people. There are still too many in Hawaii who place what they consider their own immediate advantages above all else, too many anxious to sell what little remains of this primordial paradise.

Plastic decay

by Allen Jones

Plastics and other synthetic polymers are undeniably of great benefit. Unfortunately it is often difficult if not impossible to get rid of them. Yet harmless disintegration is essential if we are not to be outlived by middens of plastic cups.

In the beginning there was chemical soup and from this came the two great divisions of inorganic and organic chemistry. Organic chemistry organised itself on the principle that available raw materials would be repeatedly used in the manufacture of essential substances. The selected process was polymerisation, in which little molecules became big molecules with no practical limit to the number of differing substances from a limited number of monomers. Thereby developed the natural cycle, with radiation from the sun being used to provide energy for manufacture, and biodeterioration being used to depolymerise back to the original raw material chemicals. After manufacture, but before biodeterioration sets in, the higher animals consume to their needs and leave the rest to biodeterioration agents for reprocessing towards some future demand. It is a neat and tidy system with perpetual manufacture against demand, and no waste left lying around.

Came urbanisation and the exploitation of fossil fuels. Man divorced himself from his fresh food and he had to delay biodeterioration, at least for the storage and transit period between food production and food consumption. This he did by inventing packaging and by the conversion of his carbohydrate, protein and fat into forms undesirable to insects and micro-organisms but tolerable to human digestive systems. By direct inference, packaging needed to be of a barrier material which would resist biodeterioration. Early emphasis was on inorganics, such as metals and glass, and on cellulose as the natural substance showing more resistance than most. The susceptible chemicals were extracted from the cellulose and then it was woven into fabrics or beaten and laid to form papers.

Fossil fuels provided concentrations of simple organic chemicals which man could use to start his own manufacturing processes, competing with nature but drawing his raw material from nature's own reserve stocks. Since fossil fuels also provide thermal energy the selected processing technique has been to follow the shortest economic path from fossil fuel to required substance. Philosophy has been single-minded, aimed at maximum production with least effort of substances which function according to specification. Regeneration of vital raw materials has not been a part of the philosophy; the deliberate invention of substances which defy biodeterioration has. Natural decay has been inhibited by using polymers for which nature has not yet provided an enzyme system for biodeterioration, and for which man has not had the foresight to invent his own destructive mechanism.

Present man's inhumanity to future man has so far become evident mainly in packaging and in vehicle tyres. In strictly technical terms it is not a particularly serious problem, having the technical dimensions for solution within technical abilities. In social terms, because the manufacturer limits his responsibility as far as the supply and no further, it is a serious problem. Even the social aspect could be rectified in due course if the scale of manufacture could be kept within existing limits.

Plastic farming?

Further scales make a mockery of statistics but their order can be approximated by allowing one ton of food and one ton of non-food per family in the world, all to be packaged. The significant increase is indicated when the undoubted advantages of plastics in agriculture become commercial. Using plastics to control horticultural (and ultimately agricultural) environments gives an extra 30 per cent yield and a much shorter growing period when used by scientific farmers. Its widespread acceptance on a world scale is inevit-

able. Counting plastics film alone, ignoring plastics for soil conditioning and water control, the demand is of the order of one square metre per ten kilogrammes of food produced. It is worth noting that plastics are even being used for cattle feed during the last few conscious weeks of the beast.

The ideal synthetic polymer would function perfectly, according to specification and for as long as needed, then disintegrate and depolymerise back to its original ethylene or styrene or whatever natural origin it could claim. Since applications and functional lives are many for any single polymer, such perfection is impossible but it should be practical to plan for short-term sickness and early death. The available destruction mechanisms are:

1. Reversal of the polymerisation process by using sensitive polymers held together by some included stabilising chemical which can be attacked. For instance, the mass could suddenly be made acid or alkali or sensitive to ultraviolet when the included deterioration agent was energised into inactivity. Convenient mechanisms are heating above a threshold temperature or excessive subjection to ultraviolet light. This is probably the easiest avenue of development but it presumes that the synthetic can be recovered for treatment in ovens or radiation chambers.

2. Physical destruction by the inclusion of a sensitive binding agent, again using a trigger mechanism to devitalise the stabiliser. The final result may not be disposal in the natural sense, but conversion to a powder is at least a partial solution of the problem. In fact, since many soils need this type of physical conditioner, there could be an advantage. The process may even solve the problem of how to rescue unprofitable land. The problem in physical disintegration is the relating of applications (lacking the trigger in their operational environment) to triggers (which can be applied under practical conditions). For instance, water is a pertinent trigger but a water-sensitive disintegration agent could only be used for packages moving under dry conditions and it would be useless for agricultural plastics.

3. Thermal disintegration by designing the strain pattern so that there is violent rupture above or below the specified environmental temperature range. This is difficult after the industry has spent so much money and effort in extending the operational temperature range of polymers for the sake of wider sales. It means a complete reversal of attitudes in research and development.

4. Exposure disintegration by the combined attack of ultraviolet light and moisture and cyclic changes in temperature. Existing polymers are designed to resist their natural enemy of exposure and they are modified by the inclusion of stabilisers to divert radiation from the polymer. Even so, synthetic polymers suffer on exposure and the weakness can be used for planned destruction. Again, the problem is not in the technicalities but in the reversal of attitudes amongst those who have sought perfection and must now seek production of the most inferior technical performance. Asking a polymer chemist to encourage the oxidation of polythene, which will happen if the stabiliser is forgotten, instead of seeking discouragers of oxidation, is like asking a chef to open a tin of beans, and is likely to get the same sort of reaction.

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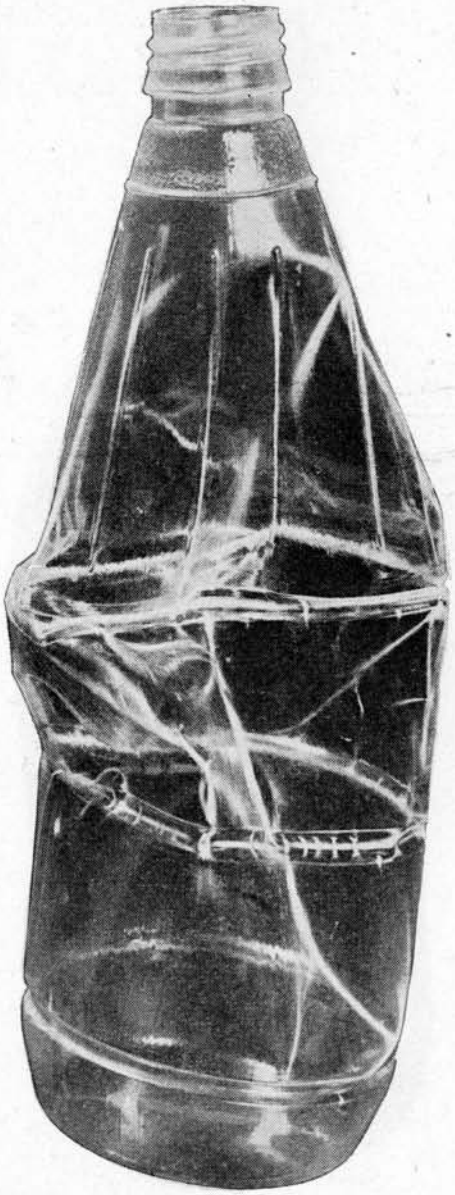


5. Biological decay, which means biodeterioration as devised by the natural system of manufacture and regeneration. Although the industry and organisations such as the Biodeterioration Centre are fully active in this direction there is a fundamental obstacle to progress. The synthetic polymers are made by an unnatural process by intent so that biodeterioration will not take place. Evolution is a very slow process and there are few hopes that the world will suddenly produce insects, fungi and bacteria with enzymes suitable for plastics. With existing polymers the effort and time are being wasted and we do not have much time.

Sauce for the degraders

What can be done, and is being investigated, is the appendage of chemical groups to polymer molecules so that biodeterioration agents have at least some satisfaction from consuming synthetic polymers, even if they stop the meal before the plate is clean. The biodeterioration agents presently available enjoy carbohydrate, amino acid and fatty acid. It is not difficult to add these into the plastic molecule.

There is a danger, already with us, that efforts will be made to invent new biodeterioration agents capable of consuming synthetic polymers. It is a two-component danger which could destroy the world with more speed and efficiency than any previous activity of man. The first component is that a virus or higher form of life which could destroy synthetic polymers could also destroy other unintended substances, leading to a distorted ecology incapable of including the present mechanism for making natural polymers. How stands the world if all vegetation suddenly lost its spark of life because a new virus stopped pollen production?

The second component in the danger is the ignorance of researching man when he starts to interfere with nature. His intelligence is pathetic against the

complexity of natural chemistry. He may be able to invent a new living chemical complex on paper but the final result in the test tube can only be an approximation. He would be well advised to steer clear of synthetic organisms, at least until we have cleared up the present mess.

On analysis, the problem of disposability can be divided into two stages. The first is the reduction of an article to a powder and the second is the deterioration of the powder into chemicals which nature can reclaim into its regenerative processes. As already indicated there is no outstanding technical difficulty in the reduction to a powder but there are difficulties in the fitting of disintegrating plastics into present distribution systems.

Perhaps the most outstanding difficulty is the intensive specialisation needed to place a plastics with an application and to define the exact time and condition of use. Manufacturers would have to multiply their ranges and consumers would have to be very careful not to vary their application environments. The ultimate would be a special material for each package and special material for each agricultural application according to the climate, which is itself unpredictable. At face value, it is an impossible scheme to maintain, even if it could be organised. It is more probable that the industry will offer decay specifications and market synthetics which suffer accordingly. Brand XYZ polythene, for instance would be marked as to specification 3092, which means it should crumble to dust after three months stretched out in an English strawberry field, or two weeks in Singapore, or never if kept on the roll in a dark attic. This is as far as the plastics industry can be expected to go without major upheavals in their distribution systems.

Who pays and who benefits?

It is all a matter of who pays and who gets the benefit. Special synthetics cost extra money to make and to distribute. Selective packaging, particularly if one product has to travel in many types of package according to its journey history, costs money and extra labour to make certain that goods for Colombo are not packed as for Belfast. The extra costs are simply added together and passed on to the eventual consumer. Everybody pays and everybody gets the benefit but there is private profit for the man who breaks the rules to supply to consumers at a lower price than can his more moral competitors.

There are claims, mainly from the plastics industry, that the disposal of plastics is less of a problem than other modern headaches, such as the processing of dead human beings and the prevention of excess carbon monoxide in city atmospheres. Expressed in terms of proportional sin the conversion to synthetics may or may not be significant criminal activity but it needs to be regarded in terms of potential growth and damage. No other development has shown the same continued and determined expansion, or the same technical ability to enter into all facets of urbanised society. The future is wide open for wholesale replacement of all natural non-food structures and metals. One private estimate puts the saturation level at nearly one ton per person per year. It is to be hoped that the industry will have organised itself to include disintegration as a vital part of its technology long before then.

Britain's dying chalk streams

by D. S. Martin

The chalk stream habitat of southern England is unique. Although isolated examples and small groups occur elsewhere such as in Yorkshire and in Normandy, the continuous band of chalk rivers which exists, or did exist, from Norfolk in the east to Dorset in the west is without parallel. Through ignorance we have destroyed a third of this habitat, and in full knowledge we are now systematically attacking the surviving rivers one by one, using the very process which ruined for ever the once beautiful chalk streams surrounding London—upstream borehole abstraction. This kind of abstraction is totally unnecessary, uneconomic in natural resources, and barbaric in conception. It is caused by short-term and mistaken thinking on the problems of water supply. It is the old story of expedience versus amenity.

In the broadest sense, a chalk stream is a spring-fed river flowing across a chalk terrain. Unlike the rain-fed rivers of the north and west these streams are contained in gently sloping valleys in which, because of the absorbant nature of the chalk itself, the rainfall is absorbed by the chalk outcrops on the hills. The strata then become saturated up to a certain level, known as the water table. The height of the water table is governed by the level of the river itself into which the underground water overflows.

The result of this regime is a river of more or less constant flow, not subject to wide fluctuations in level, and fed by springs of pure, cold water filtered by the chalk. Because it is alkaline, the chalk stream is ideal for crustacea, insects, and a variety of fish. The habitat of these animals is dominated by a luxuriant and exceedingly beautiful aquatic weed growth.

Besides forming an integral and vital feature of the valleys through which they flow, these rivers are of immense value biologically and they offer the finest fly-fishing in the world. However they are particularly vulnerable to abstraction.

With increasing urbanisation, our southern rivers are having to carry ever increasing loads of unnatural water. Treated sewage effluents, the run-off from intensively cultivated land carrying fertilisers and insecticides, drainage from roads and roofs, industrial effluents and other discharges now enter these streams by means other than those intended by nature. These increasing flows are changing the chemical content of our rivers and are unavoidable. The only safeguard lies in adequate dilution. The one hope for the survival of our southern chalk streams is to leave their springs untapped.

There is no magic quantity of upstream abstraction which a river will tolerate without loss. With the ever present warning of the ruined streams behind us and the certain knowledge of increasing urbanisation before us, it must follow that any depletion in spring flows to any of the surviving chalk streams will inevitably induce a decline in the chalk stream habitat. Until the Government, the Water Resources Board and the fourteen river authorities recognise and act upon this fundamental truth, we shall continue to lose our chalk streams one by one.

Borehole abstraction consists of drilling a hole into the ground in order to tap the chalk aquifer on an underground drain or fissure and pump the water away to the supply. If such a borehole is sited on the upper or middle reaches of a chalk stream the total discharge from that borehole will be lost entirely

An old corn mill on the Kentish Stour at Chilham

to the river. This basic hydrogeological fact was confirmed during the three-year test-pumping carried out on the river Lambourne by the Thames Conservancy.

A chalk stream afflicted by boreholes can decline in one of two ways. If the abstracted water is simply pumped away, consumed and disposed of further downstream or into another watershed, the river will partly or entirely dry up, particularly in its upper reaches. On the other hand if the water is returned at or above the point of abstraction, the effect will be to replace the abstracted water with treated sewage effluents. This gives rise to *eutrophication* or enrichment of the stream.

Flannel weed

Certain inorganic salts form the inevitable end-product of sewage purification in which organic matter is converted to inorganic solutions such as nitrates and phosphates. These substances act as fertilisers in the rivers just as they do on land and encourage dense crops of algal growths including flannel weed, a long dark slimy filamentous growth which is unpleasant in both appearance and smell. In sufficient quantity this flannel weed will carpet the entire river bed and will eventually displace the natural weed growth by cutting out the sunlight.

H. B. N. Hynes, one of the leading authorities on pollution, has attributed excessive flannel weed to treated effluents in his classic work, *The Biology of Polluted Waters*.

It has been demonstrated on such rivers as the Hertfordshire Lee and the Middlesex Colne that excessive flannel weed can be just as objectionable as badly treated sewage. Being a rootless growth it floats off downstream in the summer, collects at all obstructions and smells like sewage. It encourages swarms of midges and gnats and causes the bright gravel to go black due to silting and algal growths. The result of these changes is to eliminate the typical chalk stream animal life and to create an environment which trout and eventually coarse fish will not tolerate. Eutrophication, due to effluents insufficiently diluted, will transform a beautiful river into a foul and polluted watercourse.

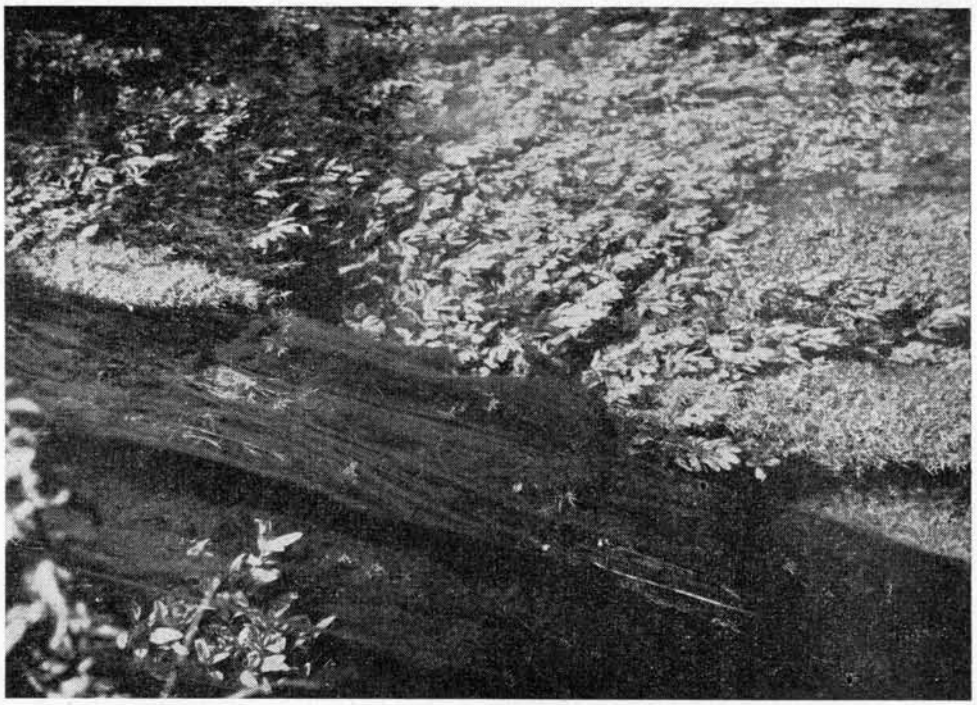
The threat from abstraction is caused by using out-dated methods of obtaining water supplies unrelated to modern demands. Until the turn of the century the demand for water was generally insufficient to reduce greatly the chalk streams.

Between the wars, and more particularly since the last war, the enormous expansion of London and the urbanisa-

tion of the surrounding countryside combined with a greater individual consumption of water, imposed problems of supply which far exceeded the capacity of the old water works and early reservoirs.

The development of the Hertfordshire New Towns resulted in water demands which had to be met locally and boreholes were sunk into the tributaries of the Thames rising in the Chilterns. At the time the water undertakings maintained that they were tapping water in deep strata which would not flow into the rivers in any case and that river flows would be unaffected.

But they have been proved wrong and their activities have destroyed almost all the Hertfordshire chalk streams including the Lee and the Middlesex Colne, together with their small but exquisitely beautiful tributaries. These were once considered to be equal to the famous Hampshire rivers for their scenic beauty and trout-fishing qualities.



Flannel weed covering healthy weed growths on the Kentish Stour near Chilham

Some streams not yet destroyed

The chalk streams surrounding London have been destroyed for ever, but there are streams which have been attacked by the water-supply industry but not yet destroyed. These still exhibit the basic characteristics of a chalk stream, though they support a reduced population of most of the plants and animals which such an unspoilt stream holds in abundance. These rivers show only too clearly the first symptoms of their eventual ruin.

The Kentish Stour, the last surviving chalk stream in the south-east, is a perfect example of such a river. Until the last war it was probably equal to the Test or Itchen for the quality of its fishing. Since then the expanding industrial town of Ashford has enormously increased the flow of treated effluents which enter the stream. Even so the Stour would certainly have survived this onslaught were it not for the grossly excessive rate of abstraction which has been allowed from boreholes sunk into the Stour valley, amounting to a total of about 11 million gallons per day (mgd) compared with a dry weather flow of the Stour, including effluents, of 23 mgd above Canterbury.

The result of the two-pronged attack on this lovely Kentish stream has been to reduce it at times and in certain sections to a condition which is little better than a river of pollutants. Nevertheless it still possesses in general the attributes of its former excellence and continues to provide great amenity value to the towns and countryside through which it passes.

At a public enquiry held in Canterbury early in 1968 an application to abstract 6 million gallons more water per day from the Stour was halved. Whether the river will survive this further 3 mgd taken direct from the springs remains to be seen. Threats of even more abstraction still exist.

In the days of the Hertfordshire abstractions there may have been some excuse because the appalling devastation caused was not fully realised. Now there is no conceivable excuse. Yet the threat is spreading far and wide and embraces the famous rivers of Hampshire, Wiltshire, and Dorset.

Applications were submitted in January 1969, to sink two boreholes at Brixton Deverill on the headwaters of the Wylye in order to abstract 2 mgd and at Mere on the headwaters of the Dorset Stour to abstract 3.6 mgd. A public enquiry was held at Warminster in April, 1970, as a result of which the Secretary of State for the Environment has disallowed the Wylye application pending further investigation by the river authority but has allowed the increased abstraction at Mere.

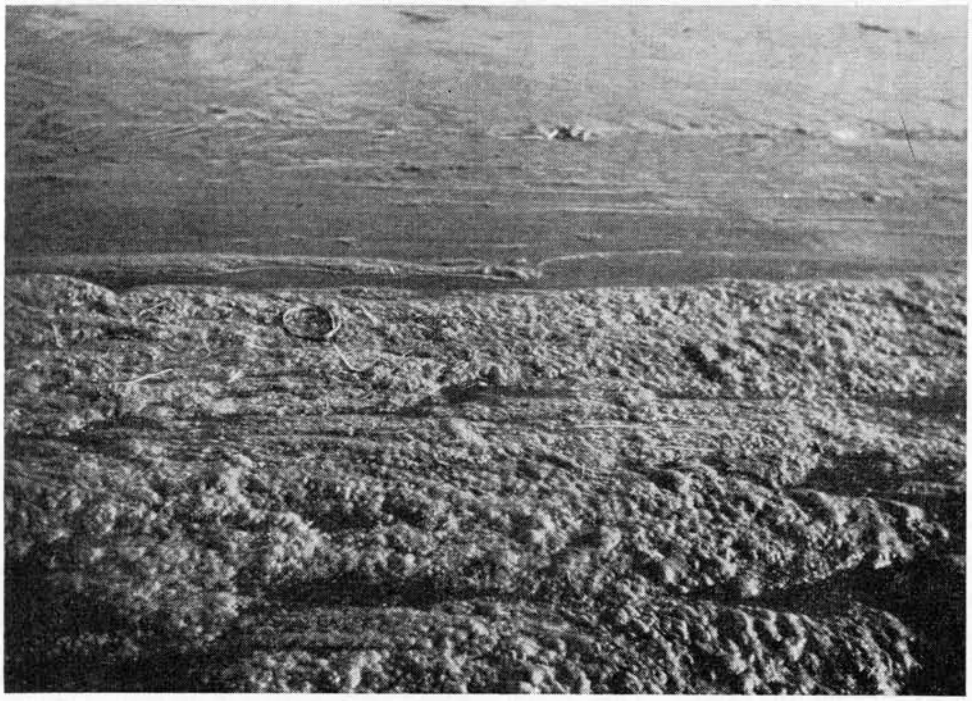
Also in January, 1969, an application was made to sink boreholes into the valley of the Sydling Water, a headwater stream of the Dorset Frome, to abstract 6 mgd. The flow of this perfect little chalk stream is only 3.5 mgd in a dry summer, and although the application has now been reduced to about 3.2 mgd, the effect will be to dry up the entire stream in precisely the same way as the Hertfordshire rivers dried up, and for the same reasons.

In August 1970 the Winchester Water Undertaking applied to increase their abstraction at Easton above Winchester on the Itchen from 4.65 to 6 mgd. Despite the submission of many well-informed and carefully considered objections to this proposal the Hampshire River Authority granted the licence without even allowing the objectors to state their case at a public enquiry. Furthermore they gave no reason why the river should be robbed of its spring water beyond the implied reason of cheap water at any price. This occurred in European Conservation Year.

In addition there are plans to abstract from the Tarrant, a tributary of the Dorset Stour, the Lesser Stour, a tributary of the Kentish Stour, the Candover Stream, a tributary of the Itchen, and no doubt many other chalk streams not yet disclosed.

More boreholes must not be allowed

If these applications are allowed in part or in whole the damage caused by these



Algae growths on the surface of the Kentish Stour at Chartham, indicating eutrophication

and later boreholes will destroy the entire chalk stream habitat by the end of the century. We will have sacrificed, for the sake of a little cheap water, one of the most wonderful geological formations in the world and deprived future generations of a priceless heritage for ever.

The future demand for water supplies is enormous. In 1965 it was estimated that by 1981 the south-east of England alone would need 436 million gallons more water per day, an increase of 50 per cent in less than twenty years. It is everywhere agreed that by the end of the century the long-term methods of obtaining supplies based on the principle of downstream abstraction and the re-use of water will have to be universally implemented. If the demand could be met by borehole abstraction alone, there would exist at least some purely utilitarian justification for sacrificing our rivers; but they cannot be so met. It follows that the influence upon the ultimate cost of water by obtaining a small quantity now will be slight and the financial benefit temporary. The loss to the countryside will be immeasurable and permanent.

It is a fundamental principle in ecological terms that upstream abstraction on any river, be it chalk stream or a rain-fed river, causes maximum harm since it diminishes the river for its entire length. There is less water to dilute impurities when the river is low and less to scour away silt when it is high. Also, by abstracting near the area of minimum flow, minimum yield is achieved.

By contrast, downstream abstraction involves taking water out of the river as near the estuary as possible for storage, purification and pumping to supply. Although this method costs more initially, it will achieve a far greater yield and cause minimum harm since the natural flow of the stream is undisturbed and the spring water can thereby perform its amenity function before it is used.

Advantages of barrages

Barrages such as those proposed for the Solway, Morecambe Bay and the Welsh Dee, which store water in the estuaries, represent an extreme case of downstream abstraction. So long as the runs of migratory fish, where they occur, are safeguarded they can produce massive water supplies whilst adding to the amenities. Even further advanced is the possibility of desalination.

There can be no doubt that the cheapest and easiest method of taking water from a chalk stream is by means of upstream borehole abstraction. Like many simple solutions, however, it causes the maximum harm. It is absolutely fundamental to the very existence of the chalk stream habitat that a clear policy should now be formulated by the Government through the Water Resources Board whereby the principle of downstream abstraction is universally accepted. The traditional method of obtaining supplies by tapping the springs ought to be totally condemned.

The main problem now is one of administration. The water supply industry is not only committed to obtaining cheap water at any price without regard to the countryside but it also achieves its supplies by means of a series of uncoordinated companies, boards and undertakings, each separately constituted and working independently within the confines of their individual areas. There is as yet no National Water Plan. The solution to this aspect of the problem clearly lies in the nationalisation of water and the implementation of an overall policy taking into account the preservation of the environment.

The protection of our rivers lies with the fourteen river authorities under the guidance of the Water Resources Board, set up by the 1963 Water Resources Act largely for this purpose. It is the river authorities who can grant or withold licences to abstract. Experience in Kent and Hampshire however, has shown that the river authorities possibly in the past due to ignorance, are liable to prove ineffective in protecting their own rivers. The Water Resources Board has given little guidance on the related problems of abstraction and eutrophication and it would be a great step forward if they could now define their policy.

But Government and public bodies tend to compromise. The greatest danger now is that a solution to the problem will be put off by granting piecemeal applications. Compromise within the sphere of borehole abstraction simply delays the destruction of the river since the water undertakings always come back later on for the extra water. The Kentish Stour provides a typical example of this mistaken policy where the application for 6 mgd was reduced to 3 mgd at the public enquiry; so does the Wylye, where the first application of 5.5 mgd was reduced to 2 mgd before the public enquiry was held.

The value of an unspoilt chalk stream is beyond all price. It is of fundamental concern, not only to fishing, but to man's environment as a whole that no river should ever again be sacrificed for a quick return of cheap water.

Environmental Politics

by Michael Gurstein

The environmental movement in Britain, if it exists at all, is so fragmented that it cannot yet provide a convincing political alternative. Yet the preoccupations and attitudes of the main political parties are often so remote from those of the electorate that such an alternative is vital. Here Michael Gurstein considers the reasons why the environment has not become a political issue and suggests a brief on which environmentalists might unite.

The seeming victory by environmentalists in the USA over the Super-Sonic Transport (SST) raises the question why the anti-Concorde campaign in Britain and other such campaigns have not "got off the ground".

An obvious explanation is the lack of a wide-spread environmentalist movement or the failure of environmentalism to take off here in Britain. In this as in other things perhaps we are two or three years behind the States. The trendy subject for the seventies, ecology, is still relatively unknown in the press and media; and the student barricades haven't yet been raised against pollution.

But the issue may be more complex. The Anti-SST forces were able to win only by swinging the politicians against it. Environmentalism has begun to have sufficient "clout" as they say there, to allow politicians to resist the influence of a very powerful, wealthy, well organized lobby from the aerospace industry and public pressure from President Nixon.

In Britain the debate around Concorde was primarily concerned with the economic costs of the aeroplane versus its possible economic return, and little was heard about the threat of atmospheric pollution, noise pollution etc. which would result. Both major parties early on decided that benefits to be gained outweigh costs and there the debate rested until the flight of the prototype and the coincident debate on the American SST. The decision to go ahead was based on simple economic calculations (with national prestige and the employment benefits thrown in as an added benefit). Neither the Tories nor Labour were prepared to act as a public defender for Britain's environment and they both conspired to exclude Concorde from the political arena and to place it in the administrative category of "National Interest".

Another example of this type of exclusion from political argument of a major area of environmental interest is the Greater London Development Plan (GLDP). This plan, originally commissioned and accepted by a Labour controlled Greater London Council, passed to the tutelage of the Tories when they won control of the GLC.

In the 1970 GLC elections both major parties were committed by their past performance to a position of support for the plan. As a result, even though the

in Britain

plan has been described as one which "exceeds in the immensity of its scale and the importance of its repercussions any decision ever made by a local authority in this country", it was not initially a subject for debate. Nor with the system of party allegiance were individual candidates prepared to commit themselves to opposition whatever their personal opinion.

Homes before roads

The inquiry which is being held to deal with objections to the GLDP is limited by its terms of reference to dealing with "specific objections" and not to the overall plan or to the set of priorities implicit within it. These will irrevocably determine London's future development and a Londoner's environment for the indefinite future. Not only do those with objections lack the resources available to the GLC but they are restrained from introducing the general questions with which many of them are most concerned.

It is here that the British situation differs from the American. With the looseness of party ties in the US individual congressmen can be persuaded to raise general questions of priorities and thus to represent in a political fashion environmental interests. In Britain with its system of party discipline and party affiliation based on crude economic factors this has not been possible except in the case of the Liberal Party whose effect appears to be minimal.

A result of this impasse in the Greater London Council election was the formation of the Homes Before Roads groups which contested 85 of the 100 seats in the GLC. Their success in the ballot was non-existent receiving only 2 per cent of the vote. They did, however, succeed in introducing into the discussion the general problems posed by the GLDP. They forced both the Labour and Conservative Parties to consider their positions in the light of Homes Before Roads' criticism, though without provoking a major change in either.

It also brought together a group of people whose environmental commitment was greater than their allegiance to any of the competing parties. The characteristics of members of the group is revealing—they were middle class, mostly professionals involved with the environment — planners, architects, economists; they were of all political persuasions; and they all saw environmental problems as being political and felt that none of the parties as presently organised could cope with them.

Their lack of political sophistication meant that they could bravely mount a campaign with no organisation, no money and no influential backing. All of this was responsible for their electoral failure but also contributed to the novelty and imagination with which the campaign was conducted, the seriousness with which they were regarded by the other parties, and the interest taken in them by the press and media.

But the aim of politics is, after all, power—how many electoral battalions that can be mustered—and in this they failed. That failure is likely to leave an indelible stamp on London.

Photograph: EAST ANGLIAN DAILY TIMES, Ipswich

With the Tory Party committed to an increase in productivity and the GNP at any price, the Labour Party echoing that commitment and the Liberal Party unsure of its future the environmentalist may be forced to more seriously pursue the "New Politics" which Homes Before Roads represented.

An urban coalition?

How can this be done? There obviously aren't that many middle-class professionals around who would eschew the influence they might have on one or other of the major parties in favour of a march in the political wilderness. But it might be possible to build an "urban coalition" of those concerned with the quality of urban life (and 90 per cent of Britons live in urban areas) and who feel that none of the parties have or can offer an electoral solution.

For this to be possible and for this to become something more than a "middle-class" conscience movement, the quality of life must be defined in the broadest possible terms. It must include poverty, homelessness, political powerlessness as well as pollution. Homes Before Roads tentatively began in this direction by attempting to make links with tenant and student groups and HBR's most electorally successful candidature was in Tower Hamlets where they organised no campaign but where they represented the only "protest" opposition in an area of strong traditional Labour support.

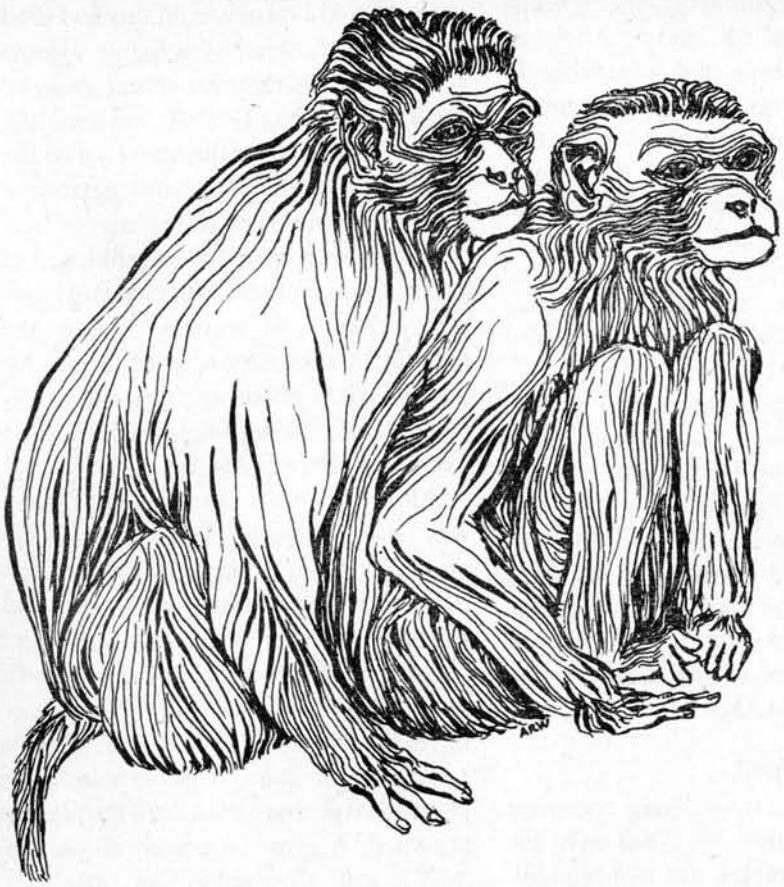
Clearly there are problems, not the least of them being the differences in political stance of those groups who are critical of the party and political *status quo*. But it would not be impossible for some type of agreement to be reached like that attained among the 85 HBR candidates, who agreed on the narrow spectrum of issues relating to the GLDP and agreed to disagree on the rest. The basis of such an agreement would seem to be the relation between environmental priorities and economic priorities, such as growth, with social priorities, such as the distribution of wealth, being closely associated.

A potential base for such a coalition might be young people who are increasingly disaffiliated from conventional political parties and who at least at the local level express this by failing to register or to vote. The Kabouters, a political group in Holland have shown that youth may be electorally effective if its commitment can be obtained.

The main problem with environmentalism in Britain is not its lack of strength but its division of forces. Hundreds of local amenity groups, ecology action groups, and the traditional environmental lobbies each act independently and sometimes at cross-purposes so that it isn't possible to mount a campaign of the type which defeated the American SST. Concorde is built but the GLDP, the third London airport, pollution in the North Sea etc. are areas which demand concerted actions not by local "specific issue" groups but by the united force of all concerned with the quality of life in Britain.

An "urban coalition" would seem to be a way in which some unity might be brought to environmentalist forces. No one as yet speaks for British environmentalists, and the scattered cries of local groups don't obtain much governmental response.

If catastrophes like the GLDP are to be prevented, all those who are concerned with the quality of urban life, and that includes those involved with the problems at the most general level, must be brought together for the promotion of new policies and priorities. The conventional parties will not respond, the minor groups aren't capable of responding and still, daily things get worse.



Population density and stress in zoo monkeys

by Martin and Hilary Waterhouse

In the "Sardine Syndrome" (*Ecologist*, Vol. 1, No. 2), Claire and W. M. S. Russell suggested that overcrowding is an important part of stress, leading to fighting and the malfunctioning of the social system in monkeys, apes and man. Here Martin and Hilary Waterhouse present observations on a captive colony of rhesus monkeys, which suggest that harmony is only possible after a balance has been achieved between the number of animals and the space available.

In April 1965, forty-one immature rhesus monkeys (4 males, 37 females), from the forests of North India, were released into the monkey temple at Bristol Zoo. The concrete enclosure is a circular pit of 90 ft diameter, with walls 14 ft high. To enlarge the area, steps rise to a central platform surmounted by a mock Indian temple. The animals were fed at one place, and apart from the daily sweeping out of the enclosure, were left entirely alone.

It was not until September 1967, when most of the animals were just mature, that we were able to study them. We spent sixty hours observing their social behaviour and we were subjectively impressed by the amount of tension existing among the members of the colony. Of course, much of the time the monkeys were huddling and grooming, but they appeared very alert, glancing around, and continually aware of other monkeys; chasing, squabbling and biting seemed very frequent. At feeding time small, ill-kempt females would rush to the food, as soon as it appeared, grab handfuls, and run off with their gains, only to be attacked by others. These same animals remained in the shade whilst larger and better-groomed males and females enjoyed the small patches of autumn sunshine.

On analysing our results we found an average of 4.4 fights per hour. Fighting ranged from simple low intensity encounters, involving only two animals, one of which chased and grabbed another, to severe quarrels involving many animals and serious bites. Some fights became very complex for example, on one occasion female A attacked female B, which led a third female to join in against female B (Bandwagon); this stimulated the dominant male to attack an innocent female, another animal joining in on this unfortunate creature.

Bad biting was common and serious wounds were observed. However, it was not only low ranking animals who were wounded but also the dominant male and large females. Once, an animal was attacked by the most dominant female, and a number of animals joined in on the victim, who was chased and froze when cornered. Three females then proceeded systematically to pull handfuls of fur out of the animal's back.

Stress manifested itself in other ways. When animals are in conflict between the desire to flee and the desire to fight, they often perform a third, irrelevant activity. During or after quarrels in Bristol, an uninvolved female would often mount another female, in the typical male copulatory manner (mounting the female, feet clasped on her back legs, and thrusting with the pelvis). A further indicator of tension, which was only observed in the lowest ranking female, involved her moving around the pit backwards, nervously watching all the other monkeys.

The posture of dominance

To many zoo visitors, the monkeys appear an unorganised mob; the more perceptive soon differentiate the dominant animal from the others, by his posture. Sleek and well-groomed, he walks around the pit in a haughty manner, his tail curled up over his back.

He will climb to the dome of the temple and "jolt", leaping up and down in a display.

We easily recognised this monkey; no female, and only one of the four males, ever showed these characteristics. However, on closer observation we were surprised to find that other monkeys occasionally attacked him *en masse*, and they did not always get out of his way. But the animals invariably gave place to a large female. These two monkeys, Algy and Vivien, shared the top position in the hierarchy. Algy monopolised the feeding space, although Vivien fed nearby; and he was groomed each morning, when it was dry, by a number of females, usually more than one grooming at a time. Vivien held her position by her aggressiveness, and because animals feared her, she was seldom groomed. When she joined a group of huddling monkeys, one by one they would walk away from her, leaving her alone. The other males feared Algy, but in a number of dominance tests, when food was thrown between them, he was seen to move away from Vivien.

From observations at the feeding space and detailed study of eleven dominant monkeys, we were able to rank the monkeys into six categories. First to feed were Algy and Vivien, two other males, and seven of the largest females. After they had left four groups fed consecutively, and finally, when two hours had passed, all the other animals having finished, the lowest ranking female was able to feed on the remaining scraps.

Algy took little interest in the welfare of the colony. He gave the impression of being a leader by his haughty circling around the enclosure, followed by many females, but unlike leaders elsewhere, he never intervened in quarrels, his only response being to "jolt" on top of the temple. Whereas sexual behaviour was observed in three of the males, it was never observed in Algy.

Infant kidnapped

Twelve infants were born between January and March 1968, but only five survived, three males and two females. We were not at the zoo at this time but we were told that seven infants had died due to interference by a highly aggressive female. During our recent study of thirteen months, 1969-70, we saw the kind of interference that can lead to the death of an infant. The same aggressive female was observed to kidnap the five-day-old infant of a lower-ranking, but experienced mother. After repeated nervous attempts at recovery during the morning, the mother seemed to lose interest in her offspring. The infant remained with the kidnapper until it died from lack of nourishment.

After the birth season, the colony was halved—twenty-one low-ranking monkeys being removed, in an endeavour to ameliorate conditions—and we next observed the monkeys in the following September. The colony seemed more relaxed, and in fact fighting had decreased by two-thirds, to only 1.5 fights per hour. Animals now gave place to Algy, but he was still frequently groomed. Aggression played no part in Algy's central position, on only two occasions was he seen to be involved in a fight, and he still did not intervene in quarrels. As before, the two remaining males kept their tails well down, and stayed out of Algy's way. Whenever male Thin One attacked an animal, he looked to see if Algy was watching first.

Vivien had become less aggressive and had lost her dominant position. Another female, Short Tail, the baby-snatcher, had taken over Vivien's role. For example, on one occasion infant Julia received a bite from Short Tail which lamed the baby for five minutes. This occurred when Julia attempted to snatch food, which was being thrown in by the spectators to the dominant female. Vivien, the mother of Julia, did not dare to help.

All monkeys could now feed at the same time. Those less dominant, however, were more likely to wait a few minutes, fed on the periphery, and were more attentive whilst feeding. All animals could now sit in the sun.

The remaining five infants were brought up by their mothers normally, although the infants were carried awkwardly sometimes, hanging under the mother back-to-front, head between her back legs. Thus, when the mother sat down, she sat on the baby's head. The infants, aged six to eight months, appeared precocious. Behaviour not usually observed until one year was

A sign of tension—one female mounts another

seen. "Presenting" the rump to a dominant animal was observed eleven times; clear attempts at grooming, the mother usually being the subject, were observed five times. Infant Paul was once seen to attempt a mount on a female infant. He managed several pelvic thrusts before falling over.

Popularity of infants

The popularity of the infants was very clear. Great tolerance was shown them by all other animals, particularly the three adult males. Females who had no babies enticed and cuddled roaming infants. It is interesting to compare this with observations by Southwick, Beg & Siddiqi, who have studied wild rhesus monkeys in urban India. "Adult males frequently attacked infants or juveniles, particularly at feeding times. If an infant or juvenile got in the way of an adult male who was feeding, the adult would often attack it, picking it up, biting it, and throwing it to the ground." (1965, 153).

Rhesus monkeys range over a large area of North India, and have adapted to life in cities, as well as in villages and forests. What is apparent is that although in the wild there is more fighting in crowded urban conditions than in the forests, there are no reports of the same level of fighting as found in Bristol in 1967.

At Bristol Zoo, when the molesting of adults by infants became unbearable, the infants would receive a clip to discourage them, though it rarely did. Infants and adult males were often observed playing together, and adult males frequently actively sought out the company of infants. The infants were not afraid of the males, and their favourite trick was to leap on the back of a male, *en masse*, and to persecute him until he started to play with them.

Life in captivity is an extreme to which animals have to adapt. Fighting, and other forms of social pathology in zoos, appear to be responses to overcrowded conditions. The behaviour of the rhesus monkeys at Bristol Zoo became more stable and less aggressive when numbers were decreased. Since rhesus monkeys are highly adaptable, the stress arising from overcrowding was probably less than it would have been for less adaptable species—that is, those usually in greatest need of conservation.

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Trace elements in the human environment by Henry A. Schroeder. An indictment of lead, cadmium, nickel carbonyl, antimony, and mercury, by the Professor of Physiology, Trace Element Laboratory, Dartmouth Medical School.

The swansong of the Clyde by Peter Bunyard and Charles MacLean. The strange story of a scheme to transform a beautiful part of the Scottish coastline into a major industrial complex; and how public participation was finally sold down the river.

Stockholm 1972 by Stanley Johnson. The first of a series of reports on the forthcoming UN Conference on Man and the Environment, this one covers recent work of the preparatory committee.

In defence of the primitive by Conrad Gorinsky. A statement of the intrinsic value of primitive peoples, the vital contribution they can make to our world, and how we can ensure their survival by helping them to make it. Together with this article we are publishing the aims and objects of *Survival International* (incorporating the *Primitive People Fund*), the only organisation with a programme for helping primitive peoples throughout the world; and a discussion by *The Ecologist* of the ecological importance of contemporary primitive societies, and why their survival is of immediate concern to the UN Conference on Man and the Environment.

Britain's environment and the Common Market by Brian Johnson. In the great debate about our proposed entry into the Common Market nobody has considered its effects on the environment. Here for the first time they are discussed, and the author shows there are good environmental reasons for staying out.

Peter Walker. Does the Secretary of State for the Environment mean what he says? Robert Allen in interview and correspondence tries to find out.

Reports

The siege of Epping Forest

London's growth is accelerating so fast that areas of open land surrounding it are under intense pressure from developers and their lobbyists in Parliament.

One such area is Epping Forest, surrounded by "overspill development" from the urban sprawl of the East End of London. The forest is the only unenclosed countryside within easy reach of those residents who live in flats and housing estates. It is a haven and refuge not only for man, but also for a significant wildlife population. The forest came into being in 1871 as a result of a lawsuit brought by the Corporation of the City of London against the owners of unenclosed common land which now constitutes Epping Forest. These owners were engaged at the time in enclosing the area and putting it to other uses. The success of this lawsuit confirmed the continued right for free-ranging animals to occupy the area—in other words the commoners' right to graze cattle, horses and other animals. Subsequently, the Epping Forest Act of 1878 secured the area as open land and since then the woodlands and pastures have remained in much the same condition as prevailed from the time of its earliest settlement. The Corporation of the City of London was appointed Conservators of Epping Forest and has since been solely responsible for maintaining, managing and financing the forest, as it also was for buying the land for public use. The finance for all this comes from the Corporation's own private funds, "City's Cash", without resort to rates.

However, the pressures that are now brought to bear on the Corporation by the Government, local councils and private interests are so overwhelming, that unless there is a sufficiently articulate influence to champion the *status quo* of Epping Forest, this oasis that we take for granted may well disappear forever.

The 1878 Act gives power to the Conservators "to dedicate roads to the public". Public demand is expressed through Parliament, in statutory measures. The extensive road-building that has been in progress for about the last two years at Walthamstow Forest (Waterworks Corner) and which still continues, has been undertaken by overriding the discretionary powers of the Conservators of Epping Forest, the issue being decided in Parliament. It should be borne in mind that the proposed M11 Motorway is intended to link up with this complex of roads, still only a monster in embryo, and the devastation of that part of Epping Forest is but a jarring note compared with the cacophony to come.

The City of London Corporation itself is prepared to introduce into Parliament a bill to stop commoners grazing their cattle in the forest. However, before they go ahead with it, they need the support of all the authorities involved to insure its success. They have that support from every authority except Epping Urban District Council. Motorists insist that cattle constitute a hazard on the forest roads. An estimated maximum of 300 are dispersed within forest areas, about 6,000 acres, in summer, and none at the height of winter. However free ranging animals impose caution on the motorist who appear to take more care on forest roads than elsewhere.

The fact that the cattle owners will no longer have the right to freely graze their animals is not the most important consequence of this new bill. What is dangerous is that once the land is forbidden to free ranging animals, the ecologically disastrous process of general pirating and extensive fragmentation of the Forest will proceed without hindrance. Lose this basic right and the Forest will wither away to a few patches of grass.

The increasing numbers of visitors to the Forest have produced other problems. Horse-riding schools are particularly against a bill which the Corporation of London is attempting to introduce into Parliament to enable control to be effected—in this case as intensive activity is damaging to the Forest floor. It appears that the local councils are opposing this measure for control.

Because of fragmentation of the Forest area by roads, of the once 100-strong herd of black fallow deer, apparently only eight have been seen this year, though not one was sighted by the keepers when they made their annual count.

Boadicea

Where democracy is not

The revolution in stock production which has taken place during the past decade or so was highlighted in Ruth Harrison's book *Animal Machines* in the early 1960s. So concerned did the general public become at the new conveyor-belt methods of keeping animals and birds that it became necessary to appoint a Committee to investigate and report as to whether standards of welfare were needed, and if so, what these should be. The Brambell Committee made a very good job of this Report, which has been studied over a territory a good deal larger than is enjoyed by the vast majority of Government Reports. While allowing that most farmers take good care of their stock, the Brambell Committee found much to cause unease, and made a number of recommendations, especially in regard to certain cruelties which it wanted banned by law immediately. Six years later, not one of them has been banned and conditions for food animals and birds have become progressively worse.

The Establishment has now begun to say reassuringly that most of the Brambell recommendations have been carried out. This is simply not the case. An Agriculture Act has been passed giving Ministers the power to make regulations, and making it an offence to cause "unnecessary pain or unnecessary distress" to livestock: but what is "unnecessary" has never been defined, and no regulation has been made. A Farm Animal Welfare Advisory Committee has been appointed, but whereas Brambell expressly proposed that such a Committee should not be representative of the interests concerned, one member has already resigned because of its vested interests. This Committee has produced some very inadequate "Codes of Recommendation" for livestock, which are not statutory, and which animal welfare interests regard as permitting unnecessary suffering. A State Veterinary Service has been given permission to visit farms and report on conditions. Its Report reveals many

disturbing items, and evidence of suffering which was not apparent at the time of the Brambell Report. Such evidence, in spite of the vets' denial that it exists, is contained in details of lameness and foot trouble in cattle housed on slatted floors; respiratory problems in cattle "resulting in spread of infection and in some cases high mortality"; injury to cattle from badly fitting tethers; injury to pigs from badly maintained floors; tail-biting (probably caused by stress) in a very large number of pig-units; food and water being withheld from sows for up to two days; bruising of sows by tethers; ailing birds at the backs of cages; distress to birds caused by faulty ventilation; food withheld for more than 24 hours—among many other items. Some very minor amendments have been suggested by the "Animal Welfare" Advisory Committee to the (voluntary) Codes in consequence.

Meanwhile, again due to public concern and pressure, the Swann Committee was set up to enquire into the use of antibiotics in animal husbandry, and made some specific recommendations. One of the most important was that a therapeutic antibiotic which is not a "feed" antibiotic should be available for use in animals only if prescribed by a member of the veterinary profession who has the animals under his care. The Government announced its acceptance of this, and after "consulting the interests concerned", it was announced that this recommendation would be implemented as from 1st March 1971. The actual wording of the Government order, however, was that "the retail sale or supply of feeding stuffs containing penicillin, chlortetracycline and oxytetracycline"—i.e. therapeutic antibiotics—"will be unlawful unless on prescription or in accordance with a written authority of a veterinary surgeon or practitioner." This, therefore, is not an implementation of the Swann recommendation, which made it clear that these antibiotics should be excluded from feeding stuffs and used only medicinally by vets *actually treating animals.*

The Government announcement also stated that "the sale and supply of the two sulphonamides, sulphaquinoxaline and sulphanitron, will be permitted (subject to certain conditions) as coccidiostats for use in poultry feeding stuffs and supplements." Swann, however, specially recommended that "sulphonamides should be available on the same terms as a scheduled antibiotic, i.e. only on prescription." (That is, not as a "feed" antibiotic). So this also is not directly contrary to an implementation of the Swann proposal.

Repeatedly, Swann urged that methods of husbandry should be improved in order to make the routine use of antibiotics unnecessary. Nothing has been done in this connection.

It is difficult to know what a democratic society can do when its manifest wishes, backed by expert opinion, are so flouted. This is no party matter: A Conservative Government appointed Brambell, a Labour Government failed to act on its Report; Labour appointed Swann and Conservatives have failed to act. Successive Governments have evaded the issues, actively encouraged factory-farming, and given the impression of being swayed by vested interests. The health of the community is threatened by the use of drugs for food animals and by the steadily mounting incidence of disease in stock, notwithstanding these drugs. The Ministries of Health and Agriculture show no sign of collaborating to produce a new humane and wholesome Code which is clearly what is needed, and what the community has asked for. It is certainly up to those who have the requisite knowledge to speak out, or to supply the full facts to those who will speak for them.

Joanne Bower

Gulliver in Automobilia, II: Wherein the Author recounts his Observations on Agriculture.

The King of Brobdingnag, as I related in an earlier volume of these Travels, gave it for his Opinion, that whoever could make two Ears of Corn, or two Blades of Grass, to grow upon a Spot of Ground, where only One grew before, would deserve better of Mankind, and do more essential Service to his Country, than the whole Race of Politicians put together. The Truth of this Proposition, which indeed seems self-evident, I never disputed until I came into Automobilia; a Land which seems like to overthrow at once all the Beliefs common to Mankind from the Days of Adam up to our own Age. Who would doubt, that it is better to be rich than poor? or that the Duty of the Physician is to preserve, not to curtail, Life? or that it is well to relieve irksome Labour by whatever mechanical Means may be devised? or that the Man who leaves to the World a numerous Progeny is to be deemed happier than he who dies without Issue? Yet all these Tenets, the Fruit of the accumulated Experience of our Race, I am now led to believe to be no more than peculiar and temporary Effects of the usual Condition of Life: for my Observations in this Land have dispelled my Belief in their universal Applicability. It may be thought Presumption in me thus to set myself up against the Wisdom of the Ages: but the unprejudiced Reader, who shall follow attentively my Account of the Polity and Oeconomy of the Automobilians, will come at last to a like Conclusion with myself.

Since I made Mention above of the Propagation of Corn and Grass, I will touch straightway upon the agricultural State of this singular People, reserving their other Peculiarities for later Consideration. They pride themselves hugely on the Beauty and Fertility of their native Land: but it is agreed among those expert in such Matters that the Former is grievously diminished of recent Years, while the Latter cannot be long maintained in its present rank and unnatural Exuberance. There are, throughout the Country, Villages of good brick Houses, which one would suppose the Abodes of a sturdy Yeomanry and Peasantry; but the Inhabitants work for the most part in distant Cities, and divide their Days between the alternate Pains of Toil and Travel. During the Hours of Labour, these Villages seem scarcely more populous than the Ruins of Tyre or Nineveh; the Men being absent in the City, the Women in the Market Town, and the Children collected from far and wide into a single School, like Felons into a County Gaol.

The Work of the Fields, therefore, is in the Hands of a few hired Labourers; two or three of whom suffice for the Cultivation of a Farm of several hundred Acres in Extent. This Herculean Task they easily perform by the Aid of diverse mighty Engines, whereby they plough, sow, and harvest, milk the Kine and feed the Swine, with as little Sweat and Dirt as a Housemaid shelling Peas. Their Beasts are not suffered to roam the Meadows and graze at their Will; rather they are penned Side by Side in Stalls; Summer and Winter alike, with

no more Sight of the Sun than Slaves at the Oars of a Moorish Galley: while their Masters, being resolved not to take the Cow to the Pasture, are at Pains to take the Pasture to the Cow. It is a sad Fact, that the Beasts so nurtured lose in Flavour what they gain in Flesh: but the Generality of Automobilians hold this of very little Account, being accustomed to esteem Quantity in all Things more highly than Quality.

In their Farming they employ the alchemical Arts to great and terrible Effect, and there is no Husbandman here but has in his Barn Poisons enough to gratify the murderous Passions of a Nero or a Borgia; with these baneful Essences they ever and again drench and douse their Fields, for it is a Maxim with them that it were better ten innocent Creatures should perish, than that one Pest or Weed should live unpunished. So by Degrees they are eradicating from the Land all living Things, whether Beast or Plant, save only those which exist by their Sufferance and for their Service. But whether they be wise or no, thus to destroy the Creator's Gifts, and at great Expense *build* a Desert, where it has not pleased God to place one, I leave the Reader to judge for himself.

Nicholas Gould

Biocontrol in agriculture: 2

Biological control, or "biocontrol" is based on ecological principles. If it is to be applied successfully, these principles must be grasped firmly.

Modern ecology really began with the Malthusian principle that population is limited by the capacity of the environment to sustain it. Malthus' essay on *The Principles of Population* was criticised severely by Doubleday who, in 1841, advanced a contradictory principle, according to which over-feeding checks population increase, while limited or deficient nutrition tends to increase fertility. The two views developed into a major controversy, with Darwin and Herbert Spencer on the side of Malthus. The controversy continues to this day and throughout its history it has stimulated a growing interest in ecology.

Malthus was concerned almost entirely with man and since man is the only creature that can modify its own environment at will, the example is not a good one from which to draw general conclusions. Also, 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.

There is no need for us to take sides in this argument, but its very existence illustrates the complexity of ecology and the difficulty even in defining it. Probably the best definition is that ecology is the science which correlates the entire complex of forces involved in determining the abundance of population in nature. This definition will not satisfy all ecologists, but it is accurate enough, provided we remember that the list of such forces is subject to steady growth, as is our knowledge of them and their effects.

Climate is a prime environmental factor. As the most obvious force controlling population density it was the first to receive special attention, but there is more to it than there may seem. Every species of insect (and this is also true of plants and of many animals) has an optimum temperature threshold for feeding, reproduction and over-wintering. Thus climate can be most important in the development ratio of any species. There is a need for more research here. Without it it is not possible to plan a biocontrol project satisfactorily. When introducing a new species we must know the adverse climatic conditions it will encounter.

We must also be able to estimate the climatic changes that will result from our own activities. The problems associated with the Aswan Dam might have been avoided had the climatic effect been calculated in advance.

It is worth noting, in passing, that many pests appear to be more adaptable to climatic change than their natural enemies. No one knows why this is so, but it has been observed frequently in field trials. Investigations are now being made into ways of assisting beneficial insects to overcome adverse climatic conditions wherever possible.

There is an average population density for all creatures. Increases beyond this are balanced by other sectors of the total environment. Thus the study of groups of creatures is of more value than that of individual species alone. It is possible to formulate a "biotic potential" of any species and the counterbalancing forces that will control it.

We must not expect too much from natural control, however. It may not reduce the population of a pest to non-pest proportions and man may have to intervene. What it does mean is that nature will provide some control once the population of any species rises above a certain density. This kind of balanced control is going on all the time, but it increases once average population density is reached. It takes various forms. Greater numbers of one species will provide more opportunities for parasites and predators; there may be a food shortage, especially in the case of those insects which cannot travel far in search of food. The most significant factor, however, is the decrease in fertility that occurs once the average population density is passed. In some cases this is accompanied by a tendency to eat the eggs of the same species.

This has been confirmed experimentally with the flour beetle, *Tribolium confusum*. Once the average population density was reached the beetle declined in fertility and adults began to destroy their own eggs and larvae. The major work in this field was done by Professor Wynne-Edwards, who has shown 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. This, in turn, ensures the survival of the species.

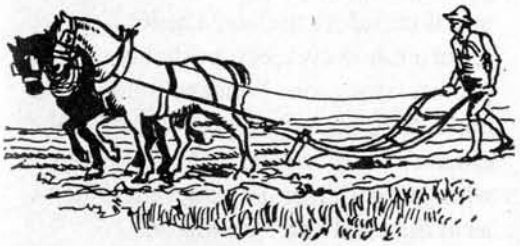
From all this it is possible to draw the general conclusion that a high reproduction rate may lead to a lower population density through the saturation of the environment and increased mortality. This is very important from the point of view of biocontrol and it shows how even the slightest intervention by man in an ecosystem may swing the balance in his favour or against him.

One result of the multi-crop system typical of traditional mixed farming is that it provided a mosaic of natural habitats for beneficial insects, so that insects could move easily from one part of the farm to another in search of food. Modern monoculture has removed many of the factors that contributed to the control of populations and under these conditions it is generally the pest that thrives. Biocontrol has found no answer to this problem. It results from a drastic change in an ecosystem with insufficient thought for the future. In spite of warnings from bio-

logists the trend towards monoculture is increasing.

State control should be avoided where possible, but there is a need for integrated land surveys and regional control over development projects, for a time. It might then be possible to give warnings of dangers that will result from ecological changes. Prevention is better than cure and it is easier to create a desert than to bring one back to fertility!

David L. Greenstock



Lessons from the soil

The structure of some of Britain's best soils is breaking down. The problem is not yet serious, but if it is not solved in the near future, it could become very serious indeed.

It was the concern felt by farmers over the deterioration of the structure of their soils that led the National Farmers' Union to conduct a survey among its own members and it was the NFU report that helped to convince the then Minister of Agriculture, Mr. Cledwyn Hughes, to ask the Agricultural Advisory Council to conduct an inquiry into the effects of modern farming on soil structure and soil fertility. That was in December, 1969. The report, *Modern Farming and the Soil*, was published on 12 January 1971.

The report finds that structure is deteriorating and the amount of organic matter in the top soil is often too low. It warns that "Some soils are now suffering from dangerously low levels and cannot be expected to sustain the farming systems which have been imposed on them".

The organic matter in the top few inches of soil is very important in that it gives the soil a texture that permits the free circulation of air and water. It is necessary for water to be able to percolate through the soil in order to carry plant nutrients to the root hairs, and air is necessary for the decomposition of the organic molecules into the simpler compounds that are taken up by plants.

There are several possible definitions of fertility all of which relate it to the availability of plant nutrients. If one of these definitions is accepted, it becomes impossible to separate soil structure and fertility, since it is structure that determines availability to some extent, and it is the organic matter that provides the environment for the micro-organisms that break down the large organic molecules into simpler forms. Some years ago the view was held that all the nutrients a plant requires can be supplied in a simple, chemical form and that the soil is a semi-inert substrate which provides little more than anchorage for the plant. It is known now that this is a gross over-simplification, but it is the only definition that allows structure and fertility to be separated—fertility relates to nutrient amounts, and these are supplied separately.

Modern Farming and the Soil finds no cause for concern over fertility, and although it agrees that organic matter is important to structure, it does not find that organic matter is a better source of nutrients. In a way, this is true: if humus is compared analytically with a concentrated fertiliser it is bound to contain fewer plant nutrients, but the role of micro-organisms in the soil is only partly known and it seems likely that crude analysis will tell us little about a soil's ability to sustain healthy plants.

Mr W. Emrys Jones, chief agricultural adviser to the Minister, and Mr Strutt, both stated emphatically that they saw no reason to believe crop yields will not continue to rise indefinitely, and Mr Jones said he had not been able to find a single field which had been so damaged that it would not recover. It may be that no such field exists, but the committee visited only 37 farms.

The expectation of a continued rise in yields is interesting because, in fact, yields are not rising. The national average wheat and barley yields have not risen since 1962. In the case of wheat the 1962 figure (34 cwt/acre) has not been exceeded and in the case of barley (28.5 cwt/acre) it has been beaten, by a small amount, in 1964, 1965 and 1967. 1968 and 69 are generally considered to have been bad years; in the Eastern Region the average barley yield was 26.6 cwt per acre in 1968 and 32 in 1969; in 1959-61 it was 24.6 cwt per acre and in 1965-67 it was 30. There was no attempt to reconcile the apparent contradiction that while fertility remained constant and fertiliser use increased, yields dropped or at best stayed level.

Nor did the report find that pesticide usage affects soil fertility. In fact, we probably do not know what effect it has, but it is difficult to believe that even in small amounts pesticides will not alter the soil ecology.

The report blames poor drainage, heavy machinery and over-stocking with cattle for the deterioration in structure, and it calls for the continuance or, if possible, the acceleration of the Ministry's programme for increasing the area of farm land that is drained. It also calls for more research generally.

Is the cry for more research an evasion? At least some of the information the report calls for exists already. The Soil Association has farmed three areas of land by different methods for many years. Although originally the soils were similar, there are now profound structural differences. The soil with the higher organic matter content has a water-holding capacity of 66.2 per cent, compared with 47.3 per cent on the soil with less organic matter. The water slaking test which measures the likelihood of a cap being formed on the surface by heavy rain gave a reading of 4.6 for the soil with more organic matter and 39.2 for that with less. Further tests to determine the ease with which the soil can be worked into a fine tilth also came down heavily on the side of the soil with the high organic content. These fields have similar drainage, they are worked by the same machines and it is the better of the two that carries livestock. With regard to drainage, the Association has also observed that the effectiveness of drainage systems depends on a good structure, without which drainage is less efficient.

Unless steps are taken to halt the deterioration in the structure of our soils we may find our ability to grow food is curtailed in the near future. In his summing up of the Soil Association conference, Sir Joseph Hutchinson said that the present troubles in farming arose through the departure from diversity and the trend to specialisation. The answer would be found in mixed farming. Farming is not simple, he said, and efforts to simplify it must be unsound. Nevertheless, there is still time to get things right—provided we have learnt our lesson. Have we?

Michael Allaby

Down to Earth

by Lawrence D. Hills

Democracy and pollution

Perhaps the most heavily polluted part of our environment is Democracy and by 1984 it may well be lifeless—poisoned by the unity between our three political parties that gives the majority of the British people no more voice in the future of their country than the black populations of South Africa and Rhodesia. It also suffers from the shrinking of the freedom of the press that is its life-blood. This has nothing to do with D Notices or "intrusion into privacy", but is the freedom of the reader to read news and opinions unpopular with his rulers.

It is still possible to use both our press and our politicians to fight against pollution, just as water from Lake Erie will still mix concrete, and in the long term the battle we can fight is one of the most important. Unless we defend democracy, which is the right of the voters to reject policies they detest, and discharge politicians they distrust, it will not be possible to protect wild life, reduce river pollution and preserve our heritage of unspoilt countryside.

During the next thirty years a number of pollution problems—not necessarily those that worry us today—will have added up to serious dangers. Not only rivers but people are going to die of pollution. If democracy dies before we reach the danger zone, the warnings of those who think further ahead than the next by-election, the next pay claim or the end of the financial year, will go unheard. It is the ultimate deterrent of the fear of losing votes and office that makes politicians and councillors listen to the individual who has something to say and takes the trouble to say it. Organisations or committees of delegates from other committees are much less important, for politicians are used to ignoring the carefully reasoned documents of the Anti-Common Market and Anti-Fluoridation bodies as the outpourings of cranks. Their individual constituents are a different matter altogether. They know that nine people out of ten sign petitions unread and for every thousand signatures only one will be from someone who cares enough to write a letter. So every letter carries weight far out of proportion to the effort of writing it.

A duplicated letter to all M.P.s is worse than useless, for their mail is full of circulars from pressure groups and Public Relations men who deluge them with expensive brochures and costly offers, and no individual or group can compete with Industry in this field. Letters with identical phrases in them (not points) are also suspect, especially those sent to all M.P.s for they compare letters when the post rises dramatically.

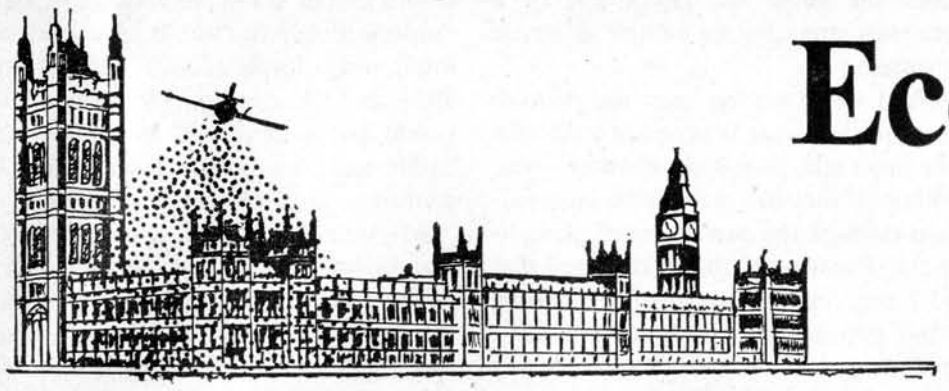
Do not copy out long passages from relevant books or send clippings, make your points as clearly and concisely as you can, never be abusive, or make it plain that you disagree with your M.P. politically. However badly expressed or even illiterate your letter, it is worth thousands of circulars. While you are writing, do a version for the Prime Minister and the Minister whose Department is concerned—for the more work the Civil Service has to do in finding material for the answers, the greater the effect. Because what are now called "the media" are so restricted by trends, advertising and proprietary opinions, letters are the only way the politicians can learn what people think, which still matters where choice remains as the core of democracy.

This principle of the value of individual letters applies even more strongly in local protest. The price of liberty today is eternal reading of your local paper, for it is here that the planning decisions that change our environment are advertised. The essential task of any protest committee is to find the date when objections must be in by and to get as many individual letters of protest as possible. The committee, as a body, should approach their M.P. and such bodies as the Council For the Preservation of Rural England or angling or ornithological societies, and of course their Council. But no protest meeting, however keen and well attended, is a substitute for house to house calling and coaxing to get the letters written and posted.

The second line of defence for your environment lies in the local weekly which will report your meetings fairly and at length, and especially anything in the nature of a demonstration. They will maintain the interest of a campaign lasting weeks that readers will follow as keenly as they follow The Archers. Local daily and evening papers are also valuable and all have the great advantage of printing letters long enough to set out a detailed and reasoned case. So let the "Hon. Press Secretary River Snore Antipollution Campaign" compose a careful masterpiece for the whole county to see, to be reinforced by shorter and angrier letters from the public. The serious Sunday and Daily papers might well print a shorter version, for planning and pollution problems are nationwide, but the popular press prints only tiny "human" letters and is therefore useless. The local paper reporter, however, can probably sell the protest story on "lineage" and gain mass circulation publicity which is the citizen's only weapon in his struggle with industrial or bureaucratic Titans, as at Stansted and Cublington.

The replacement of local papers by local radio would be a defeat for democracy, because all radio and T.V. must be "impartial" which means allowing equal time to the official spokesman who is usually a good and persuasive speaker, especially if he is paid by the industry involved, and to the protesters, chosen for local accents and "human interest". It is very rare that radio or T.V. can allow time for a reasoned case, and however sympathetically and well a programme is produced, it is over in a flash, leaving only a fast fading impression which memory soon distorts. The freedom to read, clip from, remember and quote even years afterwards from one's local paper is too valuable to be sold for a mess of advertising or for Parkinson's Law ruled empire building by the B.B.C.

It is often a criticism of *The Ecologist* that its articles merely induce gloom because the reader can do nothing about their warnings. But this is far from the truth, for while we live in a democracy every reader who is rightly alarmed by our accounts of one of the many well-documented dangers to the environment, has the right and duty to write to his (or her) M.P., the Prime Minister and the Minister concerned, and to demand action, investigation and research. If every reader cared enough to do this as a habit, our polluted and exploited planet would be far healthier and so would our Democracy. Ask not for Whom the Bell Tolls . . .



Ecopolitics

by Robert Allen

Royal Commission on Environmental Pollution

At 45p the Royal Commission's First Report is quite a good buy. Sensibly they have confined themselves to a restrained appraisal of the state of Britain's environment, so for your money you get a good introduction to air, freshwater, marine and agricultural pollution, refuse disposal, noise, radioactive waste disposal, the long-term effects of atmospheric pollution on climate—and what the Commission thinks should be done about them all.

The report is perhaps best on water pollution. On freshwater pollution it singles out three indisputable facts:

"(a) there are still some thousands of miles of polluted rivers in Britain, many of them needed as a source of potable water;

"(b) future needs for water are such that it is essential to improve the quality of some rivers; and

"(c) vigorous policies to improve rivers produce dramatic results."

In support of fact (c) the well-known improvement of the Thames is cited. In 1969 about 2,900 million gallons of water were supplied each day to homes and industry in England and Wales, and demand is likely to double over the next 30 years. The volume of domestic and industrial effluent discharged into rivers is also expected to double during this period. Yet rivers already supply a third of our water, and we will increasingly depend on them. The Commission strongly endorses the recommendation of the Working Party on Sewage Disposal that "in each river region one and the same authority should be responsible for the whole water cycle".

On pollution of the sea, the report dwells on the vast quantities of garbage we cast into our coastal waters: "Every day about 5 million cubic metres of domestic sewage, 3 million cubic metres of industrial waste, and 7 million cubic metres of cooling water from power stations are discharged along the east and south coasts of England alone... In addition, about 4 million tons of colliery waste and 1.5 million tons of china clay waste are dumped each year off the north-east and south-west coasts respectively." There is no evidence of any widespread damage to marine life as a result of such discharges; but there is of "local effects on the growth of marine plants in polluted areas along the Durham coast and in Liverpool Bay, and damage has been done to fisheries in many major estuaries, including those of the Clyde, Forth, Tyne, Tees and Thames". Not surprisingly the first comprehensive enquiry the Commission is to undertake will be into the extent and effects of discharges and dumping of wastes into our coastal waters.

Noise is singled out as the most unpopular pollutant. "Between about 20 and 45 per cent of the urban population live in roads with noise levels likely to be judged undesirable for residential areas"; and if traffic increases as predicted and noise levels are not reduced, the number will rise to between a third and two-thirds. The April 1970 regulations "should prevent a worsening of traffic noise", but present legislation "will not do much to satisfy the public demand for less noise".

Mercifully, it is the Commission's opinion that organochlorine pesticides should be subject to mandatory control and that there is now enough evidence for the Government to introduce legislation "at an early date". In addition there should be a continuing appraisal of all pesticides, their long-term ecological effects, the minimum effective doses required, and "the possible hazards of substances intended to replace existing products". The report also calls for economic incentives for the use of manure from factory farms.

The Commission believes that the Report on the Disposal of Solid Toxic Wastes "discloses practices which need urgent attention and its advice is clearly sufficient to guide Government action for the immediate future". A clear recommendation to Mr Walker to get going even before he receives the forthcoming report on Refuse Disposal. Radioactive waste disposal is satisfactory at the moment, but the proposed expansion of nuclear power holds great problems, which should be carefully examined at an international level now.

The survey is sober yet tough, therefore, except for some reason when it comes to air pollution. The report seems quite content with the effect of the Clean Air Acts on sulphur dioxide emissions, without mentioning that the Acts apply only to smoke. Although sulphur dioxide levels are dropping, they are still very high (some 6 million metric tons, compared with smoke at 0.75 million metric tons), and it is strange that no recommendation for its control was made. No less odd is the statement that "there is no firm evidence" that in Britain the present level of vehicle emissions is a hazard to health. As evidence against lead accumulates, one is left wondering what is meant by "firm". On the long-term effects of atmospheric pollution on climate, the report is cautiously sceptical.

The Royal Commission's report is weakest when it discusses more general issues. While not exactly starry-eyed about cost-benefit, it does not appear to be completely aware of its dangers. It calls for a detailed consideration of the economics of pollution, but leans towards the application of existing cost-benefit techniques rather than the development of a more sensitive theo-

retical framework. Economic growth, however, is seen as one of the main dangers, though for some reason demographic growth is not. Yet the report does not suggest that economic growth be halted, regarding it perhaps as a necessary burden.

But possibly the most serious defect of the report is that having noted that the Royal Commission has an opportunity to "contribute ideas toward a comprehensive policy for safeguarding the environment" and that "nothing less than a comprehensive policy for the environment will suffice", no attempt to suggest such a policy is made. Strange, since it also remarks that the Department of the Environment does not have responsibility for all forms of pollution. Will Lord Rothschild's Central Capability Unit see that the Department of Trade and Industry or the Ministry of Agriculture are as environmentally responsible as DoE must be? I doubt it. We need an Environmental Quality Unit—with teeth—and it would have been a help if the Royal Commission had suggested it.

Getting nowhere fast

There are over a third of a million road casualties each year, and according to Eldon Griffiths, Under-Secretary for Transport, more than half the children born today are doomed to be injured in road accidents.

Those that survive cannot fail to be bemused at the lengths to which so many people go to get from A to B. What's more they prefer to reduce the ease with which they can do so by insisting on the expansion of private transport rather than the development of rapid mass-transit systems.

Fortunately, the planners are beginning to mutter at the current bout of motorway madness. Ove Arup, for example, wrote to *The Times* (1.2.71) to say that "we must stop fouling our own nest, we must stop creating blight in the name of progress. Our community cannot afford that kind of progress any more".

Predictably however, the London Amenity and Transport Association's plea for buses to be given priority over other traffic, was rejected by the AA and the RAC. Those austere champions of monumental selfishness appear to see a solution to the nation's traffic problems in a greatly expanded road-building programme. Doubtless they will continue to campaign to this end until the silver sea clings not to a precious stone but to a knob of sterile concrete.

And while we fret over the pullulations of the Great Wen, spare a thought for those who live in the country—who look as if they are going to be immobilised through the parsimony of Government. The Maud report calculated that 41.7 per cent of the 10 million-strong rural population owned nothing more polluting than bicycles. To take away their ridiculously infrequent bus services is sheer lunacy, when from now on we must dissuade our fellows from the anti-social indulgence of car ownership.

These pHoolish things . . .

The Agricultural Advisory Council has published its report on the structure and fertility of our soils (see p. 25). One of its recommendations is for an increase in the quantities of lime that our farmers apply to their land.

The problem arises because the heavy use of artificial fertilisers causes an increase in the acidity of the soil—the pH value decreases. There are two approaches to a solution to this headache. Acidity may be corrected by the application of an alkali—the lime the AAC calls for. The other solution, which would be cheaper, is to reduce the application rates of the fertilisers that caused the acidity in the first place. Perhaps it would be unrealistic to expect the cheaper solution to be the one preferred, because, so we would be told, crop yields would suffer. If application rates were cut off abruptly this is probably true, but if they were to be reduced steadily over a period it might not. In fact yields stopped rising some years ago—but fertiliser usage has increased year by year. But, then, whose money are we interested in saving?

The thin end of Wedgie

New York State is trying to do the very thing we should be doing in this country: cut down airport noise. Mr Andrew Stein's Bill would reduce maximum noise levels to 103 decibels by 1974 and 98 decibels by 1978. This would put a large nail in Concorde's coffin, and thus he has earned the opprobrium of Mr Wedgwood Benn.

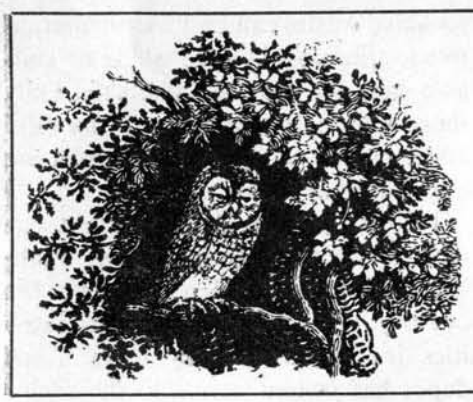
Mr Wedgwood Benn is a technological inebriate, and considers the only currency worth paying to environmental quality is lip-service. Nonetheless, the degrees to which he went to scare New York's health committee into changing its mind, must have startled even the most blinkered supporter of growth-come-what-may.

If the US decided to "frustrate ten years of British and French effort", he threatened, it would have a serious political effect in Europe, and enormous tariff barriers might be raised against US exports. In other words, just you wait. "Of one thing I am certain", he frothed, "we will not have Concorde killed in order to help the current US battle to get their own supersonic airliner scrapped". In other words, environmental improvement in the US should not impede environmental disruption in the UK.

Then came a feeble attempt to revive America's waning enthusiasm for prestige-jockeying with the Soviet Union: the Russians were going to sell their supersonic TU 144 very aggressively. "It was very possible", he said, "that the Japanese would place options for it", which conjured up a nice picture of hundreds of bewildered Japanese stranded in the stratosphere, bound for America but able to land only in England.

Finally, he claimed, the noise generated by Concorde did not present a major threat to the environment (then what was he worried about?), but if it did people should install double-glazing and keep their windows shut.

Environmentalists, take heart! With enemies like Wedgie, who needs friends?



Towards a unified science

Instinct and intelligence

Among those features of man that are supposed to differentiate him from other animals is his intelligence. For a long time, this was considered to be a special faculty, which only men possessed, whereas the behaviour of other animals could be explained in terms of blind instinct. In spite of the findings of ethology, the dichotomy between intelligence and instinctive behaviour persists in the minds of all save the most enlightened, and is still a weapon in the armoury of those who wish to perpetuate the currently accepted dualism between man and other animals. Let us examine the meaning of these terms.

Whether a behavioural response is said to constitute a "tropism", "a reflex", an "instinctive act", or an intelligent one, it must be mediated by a hierarchical organisation of instructions, and differentiated at each step in accordance with environmental requirements. It is clear that these different types of behaviour differ from each other, but they do so in degree rather than in kind. As behaviour develops, and new levels of complexity are attained, the system becomes capable of reacting more and more adaptively to increasingly improbable situations.

Thus simple forms of life are capable of only the most rudimentary discrimination between the various constituents of their respective environments, and have a correspondingly low capacity for individual survival. A more advanced form of life such as the stickleback, is capable of more discriminatory behaviour. Yet during the mating season, the female will respond sexually to any red object, including the male stickleback, who adopts this colour at such a period, but also including such things as red balls or lollipops. A dog's powers of discrimination are very much higher than those of a stickleback, yet the animal will only be able to distinguish between legitimate visitors and less legitimate ones, after repeated experiences. Needless to say, man's discriminatory abilities are the highest of all, and his chances of individual survival are thereby maximised. The corresponding development of cybernismic intergy is confirmed neurologically. At each stage in the evolutionary process, the nervous system becomes progressively more centralised: if the brain grows larger and more of the animal's actions become dependent on it. Thus, if one extracts the brain of a frog, it is still capable of a number of adaptive responses. It can move its leg, for instance, if pricked with a pin. A cat, however, after its brain has been extracted, is quite immobilised, and does not survive very long, whereas a man dies almost immediately.

Is there any radical jump in the course of this process that can be regarded as a frontier between distinct forms of behaviour? The answer is undoubtedly no. The development of the nervous system appears to be a long and continuous process, and there is no reason to suppose that the human one differs from that of its closest relations in the animal world in any radical manner. All that one can say is that the processes of encephalisation and, in particular, encorticalisation, are more highly developed in the former than in the latter.

At one time, the ratio of brain-size to body-size was considered very important in determining the relative "intelligence" of different forms of life. Undoubtedly, the number of connections between neurons or groups of neurons is theoretically more significant, but, nevertheless, the former criterion provides a good indication of intellectual ability. If we apply it, we find that man does indeed obtain a higher rating than his nearest rivals, the ratio being four times higher in the case of a man than in that of a gorilla. On the other hand, it is roughly twenty times higher in the case af a gorilla than it is in that of a bird. This fact is also indicative of the impossibility of establishing a frontier between man and other forms of life on the basis of intelligence.

If learning ability be regarded as a criterion of intelligence, then this conclusion is further confirmed. As Harlow writes: "The existing scientific data indicate a greater degree of intellectual communality among the primates, and probably a greater communality among all animals, than has been commonly recognised. There is no scientific evidence of a break in learning capabilities between primate and non-primate forms. Emergence from the ocean to the land produced no sudden expansion of learning ability. Indeed, there is no evidence that any sharp break ever appeared in the evolutionary development of the learning process."

In functional terms, one can consider that man is still in possession of that hierarchical organisation of instructions that we may refer to as his "instincts", and which once determined the behaviour of our remote protohominid ancestors. All that has happened is that, as the result of the development of the brain, and in particular of the cerebral cortex, these instructions can now be applied with greater precision and can thereby give rise to behaviour that is much more adaptive.

Thus the intelligence is not a new mechanism that replaces in any way those that were previously operative, it is merely the ability of the latter to operate in a more discriminatory manner and hence give rise to behaviour displaying higher homeostasis.

Edward Goldsmith

Ecotechnics

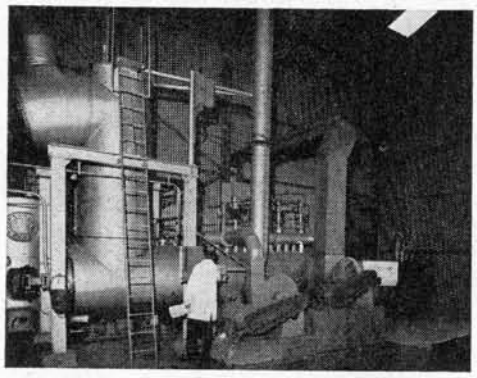
by Arthur J. Puffett

Where there's muck . . .

Pesticides like aldrin and dieldrin and insecticides like DDT, products of dubious value to farmers, have an immediate connection with used tyres, PVC waste and the cyanide-laden residues of plating works.

All are products of an advanced industrial society. All are difficult to dispose of, and dangerous if disposed of in the wrong way.

Back in 1964, a growing company called Purle Brothers Holdings Limited went public. This was the start of a meteoric climb to a position of international importance. For almost twenty years previously this company had been growing and developing skills and techniques for handling, transporting and destroying or detoxifying industrial wastes of all sorts. The original impetus for the foundation of a national waste disposal industry came from the Trade Premises Drainage Acts of 1937, and a host of local authorities' bye-laws stemming from it. After World War II industrial techniques had become sufficiently sophisticated to present problems that demanded new solutions. The greater part of industrial waste was no longer simple rubbish—it was frequently toxic and sometimes dangerous to handle. As the trend towards sophisticated processes using artificially created compounds accelerated, so the pressure to devise new techniques of disposal grew. Purle was in a position to develop its abilities and facilities in conjunction with changes in industrial practice.



Research and technical laboratories were constructed and more sophisticated neutralisation systems were developed. At the same time, new means of handling and transporting solid and liquid wastes had to be tested and put into production.

Effluents of a more corrosive or more dangerous nature demanded improved equipment, both to safeguard the men who used it and to prevent costly replacement of tankers and pumping gear at frequent intervals.

All these problems have been solved by Purle in a very convincing manner. The years of experience, backed up by the recruitment of highly trained experts, have given Purle the know-how and technical skills needed to solve these problems.

Under the chairmanship of Tony Morgan, whose enthusiasm and commitment have given the company its drive and energy, there is a board of directors who are not merely administrators. Peter Newman, the General Services Director, was partly responsible for the successful development of a roll-on roll-off system for solid waste containers and compactors, and pioneered the use of glass-reinforced plastic vacuum tankers, for transporting toxic and corrosive wastes. Hugh Berridge, the Technical Director, is a famous expert on water purification and is United Kingdom Director of the Water Pollution Control Federation, and was one of President Nixon's advisers when the drive to clean up America's rivers was inaugurated in 1968.

This policy of keeping technical development and innovation firmly in the vanguard of the group's general policies has been borne out by the international recognition accorded to Purle, which is now established as the world's leading authority on all aspects of industrial waste disposal.

Waste disposal is not merely a question of laboratory work. In addition to developing techniques for treating toxic materials, solid and liquid waste has to be put somewhere. Purle have developed land-fill operations which will eventually provide reclaimed land from what were once clay-pits, giving the community space for social amenities or agricultural land as required. The disposal at sea of certain carefully screened wastes can be a useful alternative to transport by road where no suitable land-fill sites are available. Only those materials that have no harmful effect on the ecology of the ocean are disposed of in this way.

In order to provide an efficient service to industry, the group has established a network of depots all over the country, with their own disposal facilities for the areas they serve. Each depot has instant access to the senior management and the technical resources of the group, which are also available to industry in the United Kingdom and abroad on a consultancy basis.

This last development has proved to be a very important one for the Purle Group, which has now arranged know-how and technical aid contracts with companies in America, Japan, Australia and South Africa. This export of knowledge is complemented by the feed-back that develops when new situations arise, so that Purle has always got news of the latest problems in the field. The extent of Purle's lead in international terms is illustrated by the American company, Rollins International. This giant transport and finance combine has set up an associate company with the Purle Group, through which over $100 million will be invested in a chain of treatment complexes throughout industrial America.

Recent developments by the group include the introduction of a powerful forced-draught incinerator which can completely destroy effluents that do not break down under normal biological action or which are too dangerous to release without complex treatment.

An important innovation is the use of gas scrubbing chambers to prevent the escape of toxic vapours and products of partial combustion. The design is so successful that final discharge from the chimney is almost entirely water vapours and carbon dioxide.

Another innovation which is a direct by-product of the group's American involvement is the Vactor, which can lift liquids and solids from depths greater than a normal pump can manage. This revolutionary system makes use of both vacuum and pressure as lifting agents, similar to the effects produced in nature by tornados. The idea for this system came from the USA; but the subsequent development of the economically viable form now in use was done by Purle.

Feedback

1 Working-class heroines

Swansea housewives blocked the entrance to a factory for over a week in protest against the pollution it caused. Fortified with tea and sandwiches more than 50 women, some with babies, stopped lorries entering and leaving the factory. In a protest to the Secretary for Wales, Mr Peter Thomas, they pointed out that carbon fall-out was ruining washing and endangering their children's health.

At the weekend some of their husbands joined them. One of them, Mr Harry Yates, said: "We've had 20 years of blackness, the canal getting filthier and filthier, the ducks leaving the nearby lake. All the birdlife and vegetation has gone, and it's hitting us very hard now. We won't have it any more; they must improve their control mechanisms".

Who said environmentalism is middle-class and elitist?

Observer, 7.2.71

2 A tax for clean air

President Nixon has appealed for a tax on lead in petrol and on industrial emissions of sulphur dioxide. The latter cost society thousands of millions of dollars every year and he wanted to "apply the principle that the cost of pollution should be included in the price of the product".

Over the next five years the US intends spending £5,400 million on water purification, £1,080 million on air pollution control, and £1,040 million on new vehicle exhaust systems, according to Mr Christian Herter Jr., who was addressing the preparatory committee of the UN Conference on Man and the Environment.

Times, 9.2.71 and *Daily Telegraph*, 10.2.71

3 If you can't beat 'em, eat 'em

The edible dormouse is spreading. In an area of about 100 square miles, centred on Tring, Hertfordshire, a growing number of good folk are being disturbed by scurryings and scamperings as the dormice search their attics for fruit, nuts and insects. Fortunately, the Romans have handed down an ecologically sound way of controlling their numbers. First put them in special earthenware jars, then fatten them on honey, then—eat 'em.

Hertfordshire Countryside, Feb., 1971

4 Indians demand return of land

Mapuche Indians have seized about 50 farms in the Cautin Province of Chile, where they have been confined on reservations since their final defeat in the late 19th century. They are protesting against racial discrimination and illegal loss of land.

Marxist President Allende has condemned the land seizures, but has promised to accelerate agrarian reform. Agriculture Minister Choncol went into the area, and said that he welcomed the agitation as long as it was compatible with resources. Unfortunately the Mapuche population had expanded so fast that even if the entire province were divided amongst them there would not be enough land to go round. *Guardian*, 3.2.71

5 Japanese pollution shock

Takako Nakamuna was a zinc refinery worker who was in constant pain until she committed suicide in August, 1969. An ordinary suicide they thought, until more than a year later they exhumed her body. The pathologist who conducted the autopsy discovered she had 22,400ppm of cadmium in her kidneys. She had been suffering a form of cadmium poisoning which makes the victim's bones so fragile that a cough can break several ribs.

Since the early 1950s the Japanese Government has been uncertain what to do about cadmium poisoning. It was first brought to their notice by a country doctor who treated 350 cases, of which 119 died. In December 1970, a Government anti-pollution Bill was emasculated through industrial pressure.

Sunday Times, 7.2.71

6 Tree Bill "talked out"

Sidney Chapman's Urban and Rural Environment Bill was "talked out" at its second reading. The Bill, which would have protected trees, hedges and old buildings, failed to win the support of the Department of the Environment, which felt it would add unnecessarily to the work of local authorities.

Daily Telegraph, 6.2.71

7 Should cows be banned?

Shelton waterworks, which supplies Shrewsbury, had to be shut when 200 gallons of diesel oil poured into the River Severn. A cow had nudged the tap of a tank in which the oil was stored. *Daily Telegraph*, 27.2.71

8 Public money down the river

The Department of the Environment wants to drive the M3 motorway along the valley of the upper Itchen, a lovely and much-loved chalk stream. The plan is being opposed by the Itchen Valley Parish Council, which has asked the DoE for a grant towards legal and professional costs.

Not surprisingly it has been refused—which raises an important point of principle: "It is not right", says the chairman of the Council, Commander Ronald Symes, "that the Minister should build his case using public money, and then refuse this information before a planning enquiry".

His council is prepared to spend between £5,000 and £7,000 employing engineering, planning and legal experts in its fight to save the valley. "We are arguing that it could just as well go

westward to follow the route of the existing A33, a road the Romans built, or in the alignment of the London-Southampton railway".

One man who backs the Department of the Environment is Mr George Loader, chairman of King's Worthy Parish Council. If the M3 doesn't go down the valley it will go through one of his housing estates, he says. The upper Itchen is all private property and nobody but the owners can enjoy it. His Council believes that "homes are more important than a handful of bulrushes".

Which still leaves Commander Symes with his important point of principle. DoE should either give him the information we taxpayers have paid for. Or give him a grant.

Sunday Telegraph, 31.1.71

9 Gosh really?

Anthony Wedgwood Benn is not alone in feeling pique at the arrival in New York of John Connell, chairman of the Noise Abatement Society, to speak against Concorde. Douglas Morris, chairman of the British Association for the Control of Aircraft Noise, complained that "Connell is giving the politicians a perfect excuse to make the anti-noise lobby the scapegoats if Concorde fails or has to be cancelled . . ." *Guardian*, 27.2.71

10 Ecology in education

An A-level Environmental Studies syllabus is being submitted to a number of examination boards by a working party of school teachers and university lecturers. The course includes disruption of both the rural and urban environments, noise, soil erosion and deforestation. The idea comes from Hertfordshire's County Education Officer, Mr S. T. Broad, who feels that Britain can avoid America's mistakes only if children are educated in the principles of ecology. He believes the course will be welcomed by sixth-formers since the problems of pollution have touched them "in a way no other problem has since the early days of Aldermaston". *Observer*, 14.2.71

11 Enzyme effects cumulative

Enzyme detergents can effect housewives' health, Dr I. Leonard Bernstein told a meeting of the American Academy of Allergy in Chicago. This is especially likely if they are allergic to other substances, while people with no other allergies rarely suffer. Wheezing and severe chestiness are among the symptoms, and because they are so common, many patients do not realise that enzyme detergents are the cause, until they are recommended to discontinue their use.

Figures quoted by Dr Bernstein indicated that the effect of enzymes is cumulative, which explains why "clinical problems are now just beginning to appear and be recognised".

Procter and Gamble and Lever Bros., leading American detergent manufacturers, have discontinued production of enzyme detergents, because housewives had a "vague confusion" over their safety, and demand had dropped off. Both companies insist they are safe, and in Britain Procter and Gamble and Unilever will continue their production. Biological detergents (which include Ariel, Radiant and Omo) do not confuse British housewives, they say.

The Consumers' Association would like them withdrawn. but on the grounds of cost rather than safety.

Times, 24.2.71 and *Observer*, 14.2.71

12 Who's kidding whom?

President Nixon has complimented US industry on its voluntary antipollution efforts. He seemed particularly impressed that 31 American airlines have voluntarily agreed to fit anti-smoke devices to their short-haul Boeing 727s. He watched a before-and-after demonstration in which an aircraft without the device spread a pall of ugly smoke and another with it left a thin trail. He said this showed American industry was not "the enemy of the good life". Ah well, what the eye doesn't see. . . . *Times*, 11.2.71 and *Guardian*, 11.2.71

13 Pollution of heart and mind

Increases in the standard of living appear to have had little effect on our general sense of well-being, said Mr Christopher Mayhew at a meeting of the National Association for Mental Health, of which he is chairman. "We are better fed, better clothed, better housed and better educated, our young are taller and stronger, and our old live longer. Yet we are more troubled in mind, less well-behaved and less happy. There is probably more rootlessness, more loneliness, more stress and certainly more suicide attempts and use of drugs".

Rootlessness, noise, ovecrowding, urbanisation, isolation and the rat race were psychological pollutants as dangerous to our minds as open sewers would be to our bodies. We were in danger of going the way of America. New York's Commissioner for Mental Health had recently told him in all seriousness that "not more than 20 per cent of the inhabitants could properly be classified as mentally fit".

At the same meeting Dr Terence Morris, Professor of Sociology at the London School of Economics declared that technology while improving our capacity for survival, had worsened the quality of our lives. "We travel in trains packed in the rush hour to a capacity that might be illegal for the transport of cattle; we walk in streets where ordinary conversation is impossible, and try to relax in gardens under the shattering noise of jet aircraft".

More and more we were concerned with control—of conflict, crime, and deviant behaviour in general—while much effort was spent in persuading us that we need things "without which life is perfectly possible".

Times, 26.2.71

14 Paved with sludge that's . . .

It took engineers three hours to block a hole in the wall of a sewage reservoir after a million gallons of treated sewage sludge had poured through it into the streets of Kingston-upon-Thames. Lorries had to spray disinfectant over an area of half a square mile and about 100 houses had sewage under their floorboards.

Guardian, 13.2.71

15 . . . strewn with flowers

Uckfield council want to dump 6,000 gallons of sewage a day in the valley at Five Ashes, Mayfield (Sussex). The soil is of clay and small streams flow through the valley on their way to the River Rother, so there is a good chance of some of the sewage escaping. The neighbours do not feel soothed by the council's plan to spray it with the scent of cowslips. *Daily Telegraph*, 21.1.71

16 Twitterings

Should we as a nation bow to the protectors of the environment, and if so was economic growth, "with which went a standard of living" (sic), to be jeopardised? So asked Mr Adam Thomson, chairman of Caledonian/BUA, of Glasgow's Institute of Marketing.

Lest we run away with the idea that Mr Thomson is a man who does not care tuppence for the health and well-being of his fellows, he conceded that, "even as an airline man I can see the attraction of protecting the environment". But, he added, "if we really wish to return to a pastoral existence or build cuckoo clocks rather than expand our technology and our communications and our technology as a whole, then let us at least say so, and some of us wasting our time in the industry can learn the art of ploughing, or some other activity."

Well, Mr Thompson, you could try cuckoo clocks. *Times*, 9.2.71.

17 Action urged on Lake Erie

US Secretary of State William P. Rogers has asked President Nixon's chief environmental planner to determine the most efficient and urgent means of achieving cleaner water in the lower Great Lakes—shared by the US and Canada.

Specific water quality objectives were spelled out in a report of the International Water Commission (IJC) this January. It states there is serious, injurious and detrimental pollution occurring on both sides of the boundary, caused principally by municipal and industrial wastes. As a result, "urgent remedial measures are required", including adoption and adherence to the recommended water quality standards, immediate reduction in the phosphate content of detergents, and prompt implementation of a vigorous programme to treat municipal and industrial wastes. *Press Release*, 14.1.71

18 No population policy

Secretary of State for Social Services, Sir Keith Joseph, has announced an enquiry into the working of the Abortion Act and measures to improve the family planning service. Grants to local authorities are to rise from £800,000 this year to about £2.25 million in 1972-73. This would help the growth of domiciliary family planning (an extra 500,000 households could receive advice), and equipment would be supplied free where there were medical grounds for doing so.

In reply to a question by Sir David Renton, Sir Keith said, "I would not like Sir David to delude himself that the increase in family planning is intended for population policy reasons. It is intended to increase family happiness and, as such, it has a great contribution to make." *Times*, 24.2.71

19 Objectors can claim

The Secretary of State for the Environment has deferred a decision on widening the A1 to six lanes through Hampstead Garden Suburb. His department wishes to "ensure that any adverse effect on property closely adjoining the road would be incurred only if there is no other way to deal adequately with the traffic needs of this length of road and which will not at the same time create still greater problems".

An interesting aspect of this deferment is Mr Walker's decision to allow certain objectors to claim costs, including, it is believed, the Lorry Route Joint Action Committee, which spent some £7,000 on their campaign. *Guardian*, 24.2.71

20 Ten-minute abortions

"I think it is perfectly sensible to move towards this operation as an out-patient technique", said Dr Malcolm Potts of a 10-minute abortion technique now being operated in a London teaching hospital.

The technique involves a vacuum curette and can be used only on women who are less than 12 weeks pregnant. Most patients could leave hospital an hour after the operation, though some might be required to stay overnight.

A New York clinic carries out between 70 and 80 abortions a day, seven days a week, using the new method. So far after thousands of operations there has not been one death. However, Dr Potts (who is medical secretary of the International Planned Parenthood Federation) said, "the operation is not going to be entirely without risk. It is never going to be a completely trivial thing". *Times*, 18.1.71

21 Sulphur dioxide attacks St Paul's

London's St Paul's Cathedral is slowly crumbling. £2 million is required to repair damage caused by the vibrations of heavy vehicles, erosion by wind, rain and sulphur dioxide, old age, and a leaking sewer.

Statues have been made faceless, their backs have to be supported with concrete, and fine grey dust clogs the gutters. Mr Bernard Feilden, who is fabric surveyor to St Paul's, comments: "This is literally the face of St Paul's washed away by erosion which comes from sulphur dioxide. There is nothing we can do to stop it. The only thing we can do is to stop it getting worse." *Guardian*, 6.2.71

22 Amerindians need help now

Brazil's population of Amerindians, 500,000-strong at the beginning of the century, has been reduced to between 50,000 and 70,000, according to a team of doctors who toured the Amazon basin for the International Committee of the Red Cross.

They are suffering particularly from imported diseases to which they have no resistance, like measles, smallpox and tuberculosis. Help is urgently needed, the Red Cross team concludes, for "with no, insufficient, or misdirected assistance, there will shortly be no Indian problem to solve". The Brazilian authorities are incapable of solving the problem alone, and an international programme of assistance is essential. The team proposed an ICRC aid programme with the following priorities:

1. Control of contacts (largely by the Government) between Amerindians and non-Amerindians, including labourers and tourists.
2. Allocation of protected land to Amerindians, with any transfer of populations subject to the approval of the individuals concerned.
3. Immunisation against measles, smallpox, tuberculosis and influenza.
4. Health education, including introduction of latrines.
5. Agricultural training.
6. Establishment of "basic curative medical services". *Times*, 24.2.71

student action

Student action abroad

If you are going abroad this summer or curious to know what other countries are doing you might like to get involved in student environmental action internationally.

North America is probably the most advanced in this kind of activity and Environmental Action Inc, Suite 407, 666 11th St NW, Washington DC was the group which started and organised Earth Day on 22 April last year. There will be an Earth Week in the US this year although the emphasis will be on constructive local action. The Ecology Centre movement is also well worth getting in touch with. The first one started at Berkeley, California, but information and addresses can be got from Ecology Centre, 3256 Prospect, Washington DC 20007, Tel: (202) 338-5010. The Environmental Action Coalition in New York and Environment and Fifth Avenue both produce good materials and projects. Addresses change but telephone enquiries will always oblige you free.

Pollution Probe was started at the University of Toronto and has groups at most of the Universities in the eastern half of Canada. As is obvious from the name, most of the work is done on analysis and prevention of various forms of pollution, especially in the Great Lakes basin. They have also produced a paperback introduction to environmental problems and regularly produce fact sheets such as an analysis of the phosphate content of all the detergents on sale in Canada. Pollution Probe, Dept of Zoology, University of Toronto, Toronto, Ontario, Canada. The Canadian Government because of high unemployment, is thinking of providing free travel and accommodation for all young people throughout this summer to keep the jobless students out of mischief, but it is useful for foreigners who want to see the country.

In Sweden the Sveriges Faltbiologiske Ungdomsforeningen, Norrlandsgatan 12, Stockholm C, Sweden (Tel: 08/20 64 05) is the most active and is at the moment fighting the hydro-electrification of the last major wild river in Sweden. Markku Wallin at the University of Helsinki works with Symbioosiry, Pohj. Rautatiekatu 13, Helsinki 10, Finland and other active groups such as Luonto Liitto and Luonto 2000. In Denmark the student effort over the past few years seems to have declined but Earthgoard, Box 12, 9690 Fjerritslev, Denmark could provide contacts. In West Germany, Aktion fur Umweltverbesserung, 4000 Dusseldorf, Holger Strohm, Bogenstrasse 5, has recently started and seems to be the most active. Jeunes et Nature, 129 Boulevard St. Germain, Paris 6 Tel: 326 1926, are very active and always need volunteers for demonstrations, fly-posting etc. There is also Actie Strohalm, Oudegracht 36, Utrecht, Netherlands which is the biggest of many in the Netherlands; a group just started at Barcelona University by S. Santiago Anglado Gotor, Paseo de Gracia 55, Barcelona 7, Spain; and Tabiati Koruma ve Tanitma Turk Genlik Dernegi, Ege University, Fen Fakultesi, Bornova, Izmir, Turkey. In Japan the Student Association for Conservation of Japan has been active for several years. Mihan Gakusei Shizonhogo Ranmei c/o Kyoiku-doi Yagai Kaukyukai, 1-6-8 Hai-cho, Tanashi-shi, Tokyo, Japan.

The University Science Students Association of South Africa, Malherbe Hall, Natal University, Pietermaritzburg, Rep. of South Africa is organising and coordinating an intense campaign of environmental action and research among students at the South African Universities, culminating in an Earth Week this July.

Many of these and other youth and student environmental groups are coordinated through the International Youth Federation for Environmental Studies and Conservation. This Federation brings together 35 national and regional groups concerned with conservation or environmental studies from 15 countries, mainly in Europe. It has an international programme of projects, study camps, work camps, conferences etc, all of which are run entirely by young people. It provides advice and information to young people and youth organisations who wish to set up conservation programmes and produce an information bulletin for Europe. The list of projects and camps for this summer is available from David Withrington, 40 Pensford Avenue, Kew, Richmond, Surrey, Tel: (01) 876 6051. The Federation also has various international working groups of young people. The Environmental Action working group, led by Wolter Bos, Lijnbaanstraat 19, Amsterdam, Netherlands, is coordinating various "Earth Weeks" run by student action groups in several European countries. It is also organising a European Opinion Poll to find out the attitudes of European urbanites to conservation and whether European Conservation Year 1970 had any effect. Lots of help on this survey for the large towns of the UK would be very useful; information from David Withrington.

A further development within the Federation is the establishment of a permanent centre in London for the development of youth and student environmental action on a world-wide basis. This is being supported financially and technically by Unesco and should become the nerve of an international network of young environmental activists.

Graham Searle

Books

Poetess with a microscope

SINCE SILENT SPRING by Frank Graham Jr. Hamish Hamilton, £2.

Rachel Carson began work on *Silent Spring* early in 1958. It was published in book form in 1962, but even before it appeared the controversy raged throughout America. "Silent Spring is now Noisy Summer", read a *New York Times* headline on July 22nd, after parts of it had appeared in serial form in *The New Yorker*. The word was out that the use of certain pesticides, in particular the organochlorines, was about to come under heavy attack.

The book became a classic. Not only did it make a major contribution to a national, and then international, debate, but it was readable to a wide non-specialist public. In a way this was its main achievement. DDT is one of the simpler compounds, but its full name is dichloro-diphenyl-trichloro-ethane and the popularisation of that, to say nothing of an explanation of its complex ecological effects, is no mean feat. Frank Graham believes the impact of *Silent Spring* was comparable to that of Mrs Stowe's *Uncle Tom's Cabin*.

The Department of Agriculture has been among the foremost defenders of pesticide use and efforts to control or restrict them have often been frustrated by USDA, which has been called the "Department of Agribusiness". Mr Graham explains the reason for this. When America was a nation of small farmers, the Department of Agriculture was highly influential. But as farming became more industrialised and small farms merged, the need for expert advice and assistance decreased and the Department found its power waning in relation to other departments. Pesticides came like manna from heaven to restore its lost fortunes. "It reacted", says Mr Graham, "in the tradition of all bureaucracies which feel their position threatened by shrinking responsibilities. The department's impulse to fabricate programmes which give it the illusion of 'busyness' has been especially apparent in the field with which we are interested." Assaults were mounted on pests, non-pests and insects which might one day become pests should their numbers ever increase. It was all a resounding success for USDA.

For its detailed account of the battle, *Since Silent Spring* is valuable, but the book is far more that that. It begins with Rachel Carson herself. She wanted to be a writer and she loved nature. She went to college to study literature but biology was a required subject and it absorbed her. She became a government scientist and it was not for several years that it dawned on her that, as a writer, she had found a subject. Her first book, *Under the Sea Wind,* was published in 1941, one week before the attack on Pearl Harbour. Her second book, *The Sea Around Us,* published in 1951, was an immediate success and she found herself a literary celebrity, a position she did not always enjoy. *The Sea Around Us,* remained a best seller for eighty-six weeks. In 1955 *The Edge of the Sea* confirmed her as one of America's leading writers.

It was in 1958 that she first expressed the doubts that had haunted her for some time, the doubts which led her to suggest the book that was to become *Silent Spring*. But she was not to write it. She collected material on pesticides for a much wider book she was planning on ecology and she thought someone else should write a book exclusively on this subject. When, in the end, she was persuaded to undertake the task herself, she thought it would be finished in a matter of months and that it would amount to only a small book. As time went on, and the information continued to accumulate, its size and importance became clear. She wrote and rewrote slowly and painstakingly. She felt the public must be able to understand the problem and that for this reason she must avoid technicalities so far as she could, consistent with accuracy. Her aim was to inform the public, to alert them, and to influence the government. She succeeded in both. Her book has been translated into many languages and has been read by countless individuals. Sections of it have been written into the Congressional Record. President Kennedy established a committee to review the problem. Its report, which appeared at the height of the controversy, vindicated her. Rachel Carson died in April, 1964, and among the pallbearers at her funeral in Washington's National Cathedral were Stewart L. Udall and Senator Ribicoff. The largest wreath was sent by Prince Philip.

She was a scientist. She had no time for "cranks" and was embarrassed by some of the support she received. At the same time she was aware of the beauty in the world around her. At a party to celebrate the success of *The Sea Around Us* she said: "If there is poetry in my book about the sea, it is not because I deliberately put it there, but because no one could write truthfully about the sea and leave out the poetry."

Michael Allaby

Farming for a Fall

FAMINE IN RETREAT? by Gordon Bridger and Maurice de Soissons. Dent £2.25.

SOVIET COMMUNISM AND AGRARIAN REVOLUTION by Roy D. and Betty A. Laird. Penguin, 25p.

THE VANISHING JUNGLE by Guy Mountfort. Collins, £3.15.

The current explosion of interest in environmental matters has meant an unusually hypersensitive reception atmosphere for new books on land use. *Famine In Retreat?* is among the first to take the strain, and the challenge proves rather too exacting. The authors, who combine considerable FAO and overseas development experience, examine a wide range of pros and cons involved in the race against Malthus. The conclusion is that, given population control up to a limit of double the present figure by the end of the present century, intensified food production can succeed in coping. The strategy outlined is impressive—until it begins to look like the agricultural equivalent of Sir Frank Fraser Darling's megalomaniac "technological exponential".

Right at the centre of the build-up is heavily increased use of fertilisers and pesticides, both of which are high on the anti-pollution black list. Omitted from the soil fertility balance altogether is about half the size of the world's crop biomass—failure, both on and off the farm, to process and recycle organic wastes efficiently. "Collective farming" and "co-operatives" are indexed, but "compost" is not. Sir Albert Howard, who spent 30 years wresting from nature the secrets of how to convert vegetational matter you don't want into vegetational matter you do want, might never have lived.

A community of Australian aboriginals, we learn, was destroyed by the introduction of a supposedly helpful technique. There were unseen snags. The young men who received the new steel axes lost their respect for the elders who continued to use stone axes. In any case, there were no great uses for the steel axes. In ranging through such considerations as these, the authors promisingly take up the threads where René Dumont, in *Types of Rural Economy* left off, but again there are unseen snags. The stated aim is not to stabilize peasant self-sufficiency, but to feed the world. What the world so resolutely fed is going to do with its spare time is not examined, but modern agricultural methods already

consume more energy than is represented by the food produced, so optimum population would need to be less than at present, not blissfully doubled. It depends, too, on what is meant by the word "feed". A glance at the morbidity statistics (or at the subjects thereof direct) is sufficient to indicate something very far wrong. Whatever may be in retreat, it is not the famine of quality.

Soviet Communism and Agrarian Revolution is much more successful in making its point, which is that both collective farming and state farming are so grossly inefficient that only calamity can result from channelling the undeveloped world's rural revolution on these lines. Admittedly, it is not a difficult point to make. In special backs-to-the-wall circumstances an inspired commune or *kibbutz* can fuse individual efforts to great effect, but individual fervour derives, in turn, from a sense of participation. The Lairds formed the on-the-spot impression that the average member of the leviathan state farms and collectives has about as much sense of participation as he had under the Tsars.

It could be contended, of course, that if agricultural techniques lead to bad husbandry, low individual drive might not be a disadvantage. Here, too, the authors are on firm ground, their own Czechoslovak-Nebraskan roots—plus neighbourly acquaintance with what choking summer winds brought from the Oklahoma dustbowls—having made them sharply aware of the elements needed for good husbandry. "The false myth that industrial practices and techniques can and should be applied wholesale to agricultural production should be thrown out, and agriculture should be viewed as a unique kind of production requiring special techniques and methods of organisation and application." (It could be contended, of course, that the Californian fruit corporations seems to be curiously reluctant to throw out the near-slavery conditions prevalent in migrant workers' camps. But silence, the book is about the USSR.)

Another myth attacked is that "chemical fertilisers and modern machines for applying them inevitably produce the maximum yield per acre". (Perhaps someone was flagging in the reference to the performance of independent peasant farms in Poland: "Yet the socialised sector is much more favoured; by comparison it is highly mechanised and often subsidised. For example, artificial fertiliser has been in short supply, and official statistics reveal that the state farms have been receiving nearly twice as much per hectare of this precious material aid as have the private and co-operative farms.") On the whole environmental considerations receive relatively reasonable mention, e.g.: "Western tractors may be of great value to India in making deep ploughing possible, but tractors produce only exhaust fumes, not manure, and if they are used, valuable fertiliser will be lost."

Least excusably missing from both these books is a single reference to nature conservation requirements. If these are presumed to be somebody else's watertight department, that is not how the earth works.

In fact, reverse the overall picture and you get this, the opening paragraph of the introduction by Prince Bernhard of the Netherlands to *The Vanishing Jungle*: "Those who travel in Asia today cannot fail to be impressed by the evidence of the destructive impact of man's technology on his environment. In the struggle to keep pace with the ever increasing need for more and more agricultural land, greater yields per acre and more hydro-electrical development, not only is the face of the continent changing, but in many countries the whole complex of interrelated communities of natural vegetation and wildlife is threatened."

One of Britain's leading ornithologists, Guy Mountfort played an active part in the formation of the World Wildlife Fund. He has led expeditions in the cause of conservation to several parts of the world, and was a prime mover in the establishment of the Coto Donana reserve in Spain and the Azraq Desert National Park in Jordan. The two expeditions to Pakistan, expressively recorded here, with striking accompanying photographs by Eric Hosking, were undertaken at the invitation of President Ayub Khan. They were not without their hazards, whether jeep-borne or gastronomic, but at the end they resulted in vigorous measures to arrest the otherwise headlong destruction of the country's incomparable flora and fauna. No less important, they also resulted in much needed publicity for the conservation message, the summit idea of today.

"If only we had come to Pakistan ten years earlier!" Guy Mountfort laments. But their energies had to be spread elsewhere. "One could stick a pin almost anywhere in the map of the world and find conservation problems of equal urgency, and I felt a sudden sense of desperation at the magnitude of the tasks as yet untouched."

No wonder. Five thousand years ago, men and tiger flourished in the Indus Valley side by side. The jungles and bamboo thickets which sheltered them both lasted out until modern times, but today man is eating his way through the last of them. As recently as 1930 there were a substantial 40,000 tigers left in the Indian subcontinent. Now there are less than 2,000, most of them in India. Their ecological circumstances, as well as their numerical levels, are critical: "Unfortunately, in spite of its apparently wide range of habitats, the tiger is a species which does not readily accept any modification to its ecosystem. In other words, it is dependent on the totality of the interactions of the various organisms within its chosen environment."

Including the organism called man, the first challenger and the last. Perhaps we shall wake up one morning and find that tigers have disappeared from the earth for ever. Shall we feel any happier? But with yet another species less, and one with a major image at that, our earthly home might look an accusing floorboard short for all our bleaker tomorrows. Population explosion, pollution, radiation, arms race—there is no shortage of fire centres demanding our attention, but the fiercest and most urgent is man's accelerating destruction of the biotic pyramid which supports him. Zoos, nature reserves and national parks can all play their parts in protecting threatened species, but this is at best a holding operation. Sooner rather than later we must learn to do our farming over the same land as nature does. The hardest thinking of all is still to come.

Roy Bridger

Down on the Farm

FACTORY FARMING: Symposium edited by J. R. Bellerby for the British Association for the Advancement of Science, £1.40.

DOWN TO EARTH: Real Principles for Fertiliser Practice, by Michael Blake, Crosby Lockwood, 75p.

It was in 1964 that Ruth Harrison's *Animal Machines* was first published. It is easy now to forget the impact that it made, but in fact this was comparable to the impact of *Silent Spring* in the US. So strong was the public feeling it aroused that the Minister of Agriculture, Mr Christopher Soames, called a publicity conference to state the official view on the treatment of farm animals and within a few weeks he announced the setting up of a committee to investigate the welfare of animals kept under intensive conditions. This was the Brambell Committee, which met under the chairmanship of Prof. Rogers Brambell. After it had reported a standing Advisory Committee was appointed to assist in drafting Codes of Practice. Mrs Harrison was a member of that Committee.

Factory farming continues, indeed it thrives, in spite of public opposition. The recommendations of the Brambell Committee have never been implemented but a Gallup Poll showed overwhelming support for them from the public and from the 1,900 farmers who were interviewed.

In 1968 the British Association for the Advancement of Science conducted a symposium on factory farming during its annual meeting at Dundee. Prof. J. R. Bellerby was asked to organise the symposium and to invite speakers and it is he who has edited the published proceedings.

The debate begins with the law regarding farm animals and the relationship between the Brambell recommendations and existing practice. Appropriately, since she is directly involved and since it was she who started the rumpus, this first paper is contributed by Ruth Harrison. She explains where and why the Ministry's Codes of Practice fall short of the minima called for by the Brambell Committee.

An attempt was made in Parliament to introduce amendments to the section of the Agriculture (Miscellaneous Provisions) Bill that dealt with animal welfare. The attempt failed owing to a misunderstanding about the appropriate usage for revising the text. The

Earl of Listowel, Chairman of Committees of the House of Lords, follows Mrs Harrison with a short paper describing what actually happened.

The second part of the symposium dealt with the use and effects of antibiotics. Altogether the evidence for infective drug resistance, multiple resistance and even multiple multiple resistance is incontrovertible. The Swann Committee acknowledged this and recommended that in general drugs should be used only therapeutically.

Factory farming is profitable and as it is described in the section on economics it all sounds very plausible. There is even a linking statement by the editor relating intensive livestock systems to the world food problem, followed by a paper by K. E. Hunt who argues that there is a place for them in developing countries. F. D. T. Good, a distinguished veterinary surgeon with wide experience in Zambia and Kenya points out that malnourishment in those countries is due only to lack of education. In general there is little that factory farming can contribute.

The symposium ends with an assessment of the future for British livestock by Prof. Bellerby. He agrees that present intensive systems must be moderated and he advocates a subsidy for grassland and a subsidy on organic manures and fertilisers as a means of reversing the trend towards larger and larger units. To some degree even the economic successes are questionable. Prof. Bellerby points out that farm subsidies favour factory farming and that over a period of ten years £800 million have been paid out in subsidies which benefit particularly those who rear animals indoors.

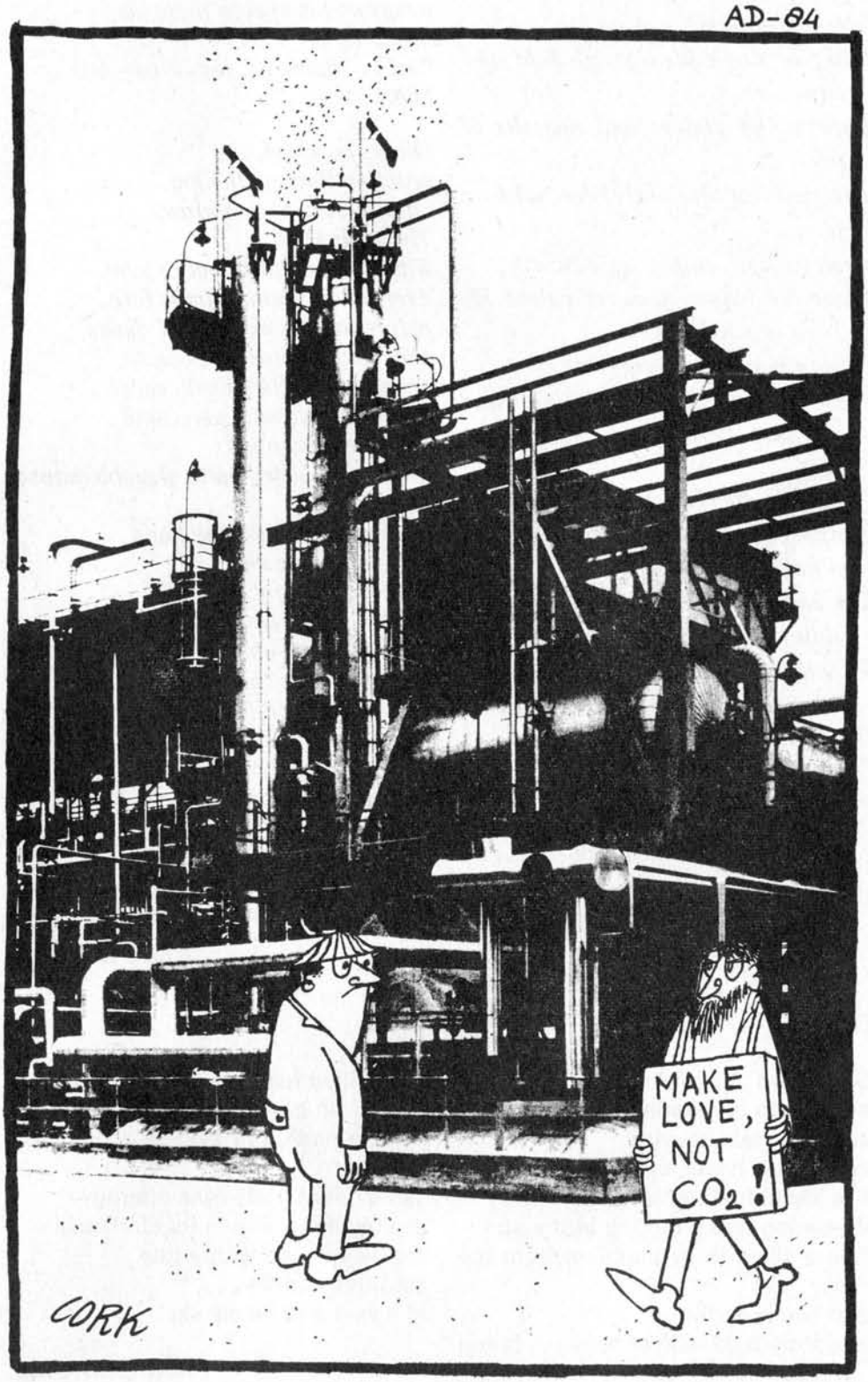
The symposium deals thoroughly with those aspects it covers, but to my mind there is one notable omission. A very large proportion of the protein produced in developing countries is imported into Western Europe and the US to feed livestock. A mention of the figures for the world trade in protein would have put factory farming into a more realistic context. It would have been interesting to speculate on its future should this source of raw material fail, as it may under the pressure of rising populations.

Prof. Bellerby's support for a subsidy on organic fertilisers would be warmly welcomed by Michael Blake. Cmdr. Blake established himself as the author of *Concentrated Incomplete Fertilisers* and he has continued his critique of the fertiliser dogma with an excellent little handbook that will be of great value to every farmer and which should be read by anyone who wants to understand the arguments for and against fertilisers. Not that Cmdr. Blake is against them altogether. He merely challenges some of the assumptions on which their use is based and reaches conclusions that would modify present practice. In particular he points out that the information provided for the guidance of the farmer is usually inadequate and that if he is to balance the nutrients he provides for his crops he needs to know more than the label on the bag tells him. *Down to Earth* is exactly what its title implies, a very basic guide to soil chemistry, and it includes practical advice on the use of fertilisers.

Michael Allaby

Letters

We regret that the postal strike so reduced our stock of letters that we are unable to run a letters page this month. Now it has ended, however, we hope you will continue to write to us, and the letters page will return next month.



Poems

EXILES

Trains were cavaliers when steam
was king:
they shook the landscape from its
feudal dream
riding in single file through field and
city.
Their white plumes and aureoles of
fire
destroyed an ancient order without
pity,
direct as logic, cutting as a sword.
Even the ruined peasant raised his
head to admire
Roman majesty, transfiguring
with classic grace their slum and
slagheap Lord.

Now they are obsolete: a new dynasty
invisibly powered and streamlined as
a bullet
has banished the old heroes to effete
sidings.
Wreathed in frost, mourned in eccen-
tric gloom,
like royal exiles in a shabby cafe,
they extol the past—and predict
electric doom.

ROBERT WALLER

TOMORROW

On a fragile platform in fog
stands—man, the social animal.
His words disintegrate as the air
wraps up his speech in its own
obscurity;
"act . . . today . . . tomorrow—too
late."

Others hurry by,
grunting through the fog,
smugly sure of tomorrow.
The air is thick
with causes/effects out of joint.
Everywhere clumsy limbs turn,
nature topples over; DDT deeds,
slick oil refinement of coasts,
countryside littered with cans/
towns littered with cars. And
babies are born into
an overpopulated earth slaughterhouse
and battered
in the process. Battery hens
cackle hysterically,
thinking the process will
soon be over, and laying
tasteless (though profitable)
bets on it. We too,
cooped up in little
cages, cannot see beyond
our noses, and meetings
to discuss tomorrow,
run rapidly into dusk.

Owing to lack of support,
tomorrow has been cancelled.

KARL MACKIE

SEE IT

See a bird . . . circling;
see a man . . . staring upwards;
see hope take to wing
and beauty hover and glide in the sky;
see life unfold its wings
darkening and glittering in the sun.
See a silver body plummet from the
sky
and fall to earth;
and from a thin silver neck . . . blood
seeps
and ruffled feathers clot and wave,
lifeless, in a gentle wind;
see life ending in slender strands of
grass;
see a gaunt body eyes staring—
see life appealing in its starkness—
and see a man with a gun
staring upwards . . .
at a vast and lonely sky.

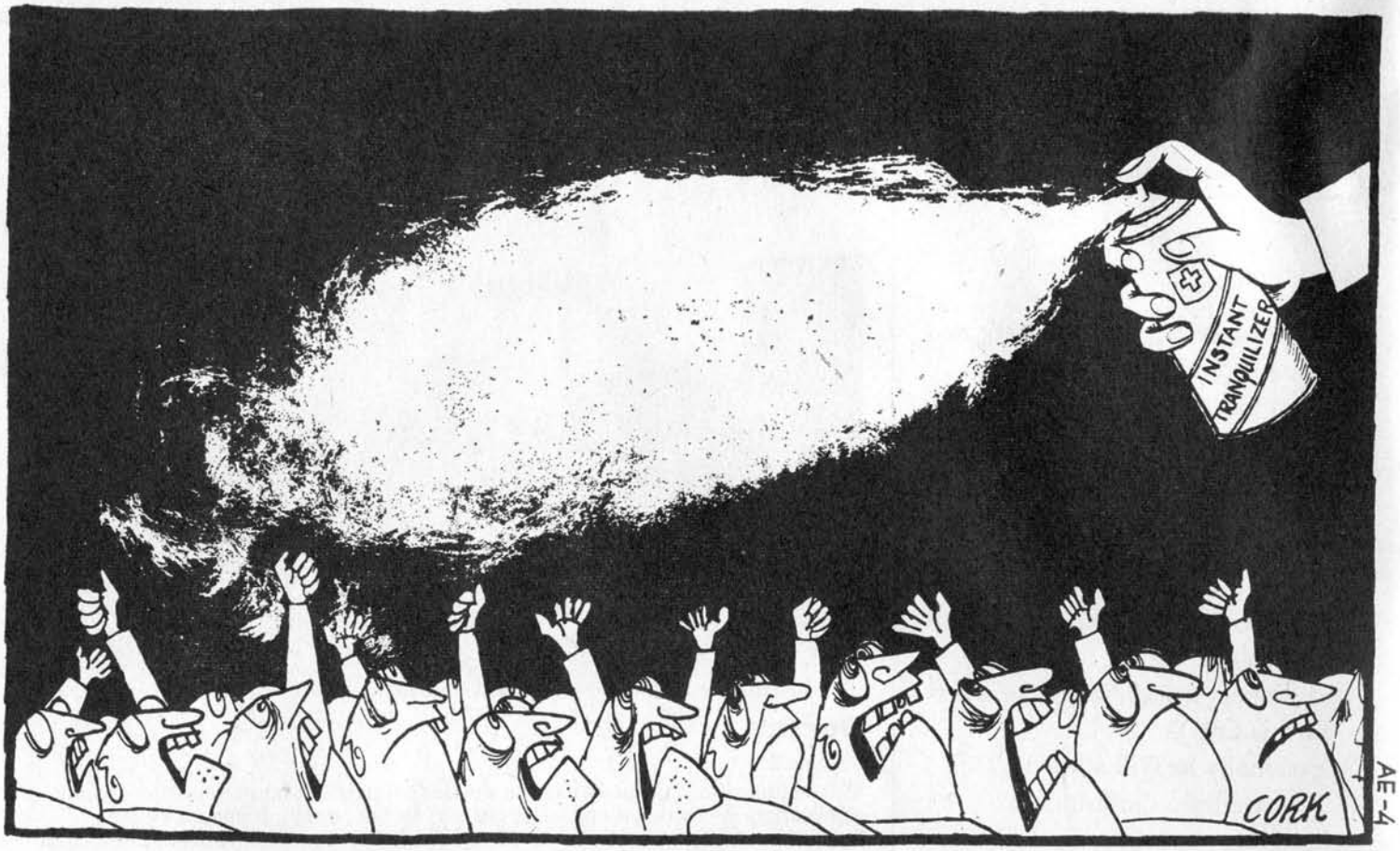
KARL MACKIE

SILAS'S SPRING.

What if Spring were silent, would
it matter
to Silas Cy Anide M.A., and
Ph.D.?
Could song find room in that in-
dustrious mind?
From home to desk, desk to labora-
tory
(plotted on a graph of time and
motion)
his scheduled moves follow the
curves of trade.
He learnt to eliminate emotional
wastes
on management courses: needless
to say
with sons at expensive schools, city
flat
and green belt villa, his ex-wife and
new,
he's no alternative to a director's
salary.
There are, though, a few things he
frets about:
his chemical prestige among his
colleagues:
mutated insects dining on sprayed
cash crops,
complaints about the rare statistical
death
from side-effects of some fool
human being
who didn't take precautions. Apart
from that
Silas is an optimistic man.
How the sap rises in his active
brain
when April blossoms forth in con-
ferences.
Any day you'll see his suave saloon,
window up and radio full blast,
a yellow light winking in the rump
speed illegally down the middle
lane
late for the airport. Watch him pass

with rigid spine and gaze aligned
like headlights.
What chance has nature in collision with him?
Seeds from his brilliant mind will shortly carry
in aural waves through headphones in five tongues
in Moscow, London, Paris and New York
(and foster world wide contracts for his firm).
Occasionally he will allow himself
a controlled indulgence: he imagines
his name in bold in scientific journals,
or, possibly even, in headlines in the press:
'Man Against the Pest' is global news.
This Spring (once more) he brings from his laboratory
the proof—checked in a quilt work of
identical field plots—which, if true
will raise the hopes of millions of underfed
(and profits of the over-fed as well)
proof that his firm has arrived at the final solution
PESTS LIKE HITLER'S JEWS
CAN ALL BE GASSED.

ROBERT WALLER



This month's contributors

John Wehrheim is a writer and long-time resident of Hawaii.

Allen Jones has spent 25 years in plastics, and is now a consultant on packaging and plastics in undeveloped countries.

D. S. Martin is on the council and conservation committee of the Salmon and Trout Association.

Michael Gurstein, Canadian. BA University of Saskatchewan, currently working for his PhD in Sociology at Cambridge. Has just been appointed Lecturer in Social Sciences at York University.

Martin and Hilary Waterhouse have been studying rhesus monkeys for the past three years, and are now at the sociology dept. of Reading University. They are particularly interested in the implications of primate research for man, and this has led to the study of human children using the methods of ethology.

Coming events

Conservation '71—an exhibition arranged by joint local and national bodies, to be held at Prittlewell Priory Museum, Victoria Avenue, Southend-on-Sea, Essex. Open: 1-12 April (except Good Friday), 11 a.m. to 6 p.m. (Special arrangements for school and other parties should be made with the Curator.)

Ecology Action Conservation Directory Additions:

LG Countryside Commission, 1 Cambridge Gate, Regent's Park, London NW1 (Telephone: 01-935 5533). Government body which reviews the improvement of facilities in the English and Welsh countrysides, and encourages conservation and secures public access for open-air recreation. *Protest. Information. Direct Action.*

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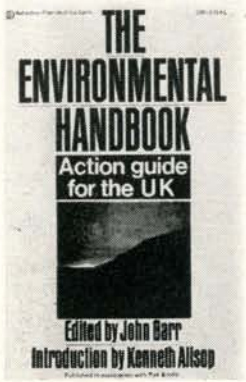

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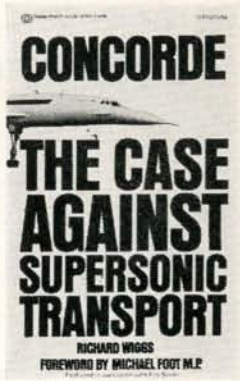

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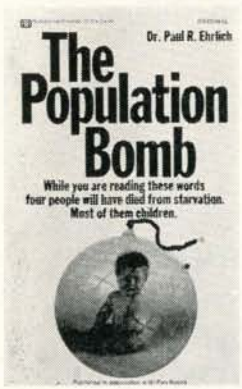

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