

The

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Ecologist

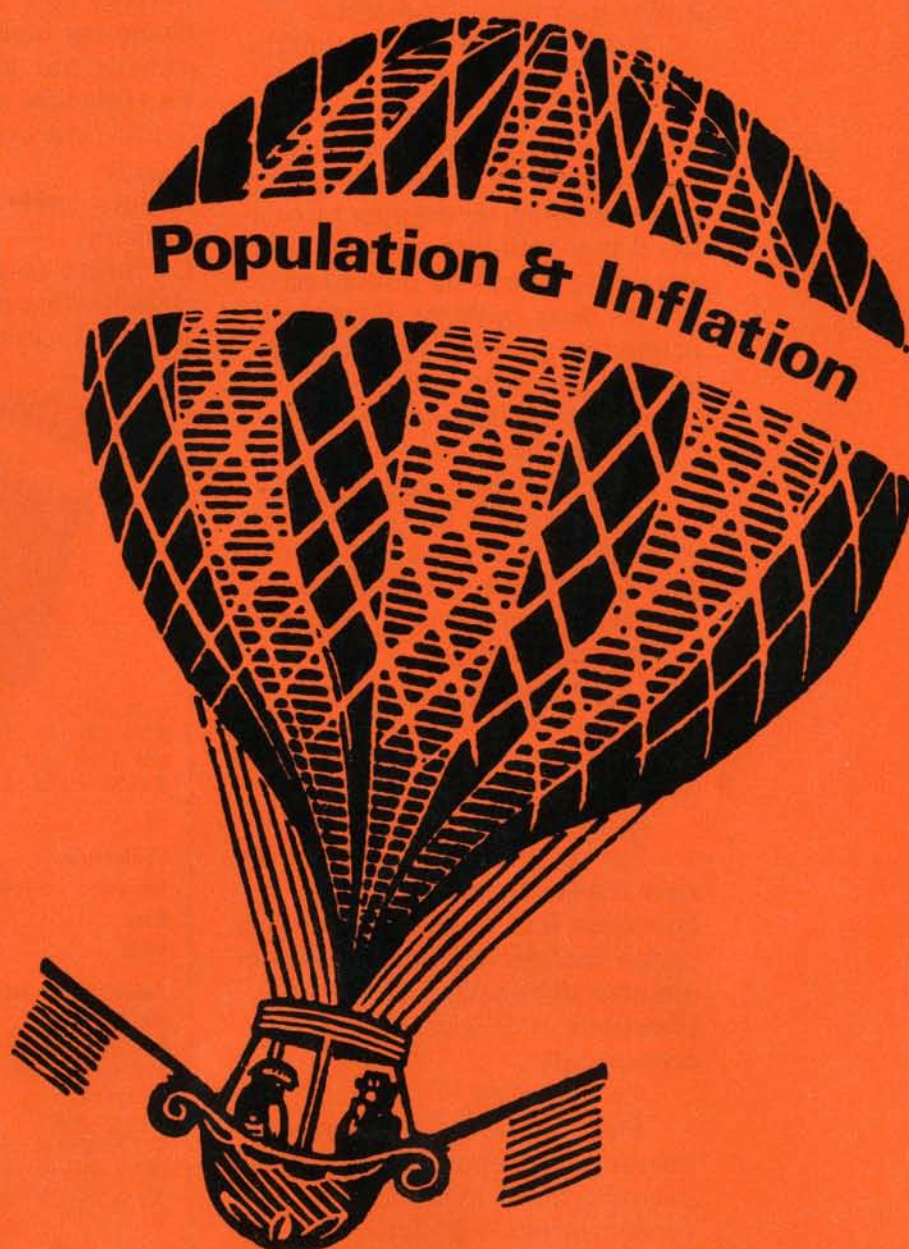
Man and the environment ■ The Quality of life ■ Pollution ■ Conservation

Vol.1. No 8

February 1971

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Open letter to the NFU ■ Ecopolitics



by W.M.S. Russell

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The Ecologist

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Editor: *E. R. D. Goldsmith*; Assistant editor: *Robert Allen*; Associate editors: *Michael Allaby, Francis Arnold, Peter Bunyard, Jean Liedloff*. Editorial copy and enquiries should be addressed to **The Editor, The Ecologist, 73 Kew Green, Richmond, Surrey**. Telephone: 01-948 0690 and 01-940 8556.

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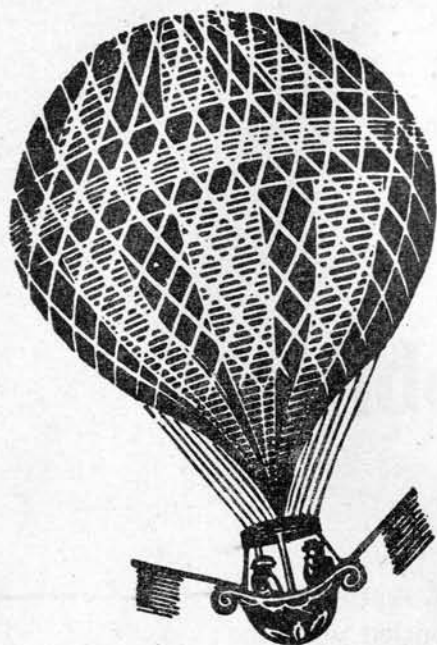


Gulliver in Automobilia

UPON leaving Laputa, I passed into the Island of Automobilia, the People whereof are to a marvellous Degree busied with the Conveyance of Goods and Persons about the Kingdom. To this End, they are continually engaged in the Constructing of numerous and wide Roads, whereon they are borne at great Velocity in Carriages all of Iron: the which are propelled, without Aid of Horses, by the Combustion of a volatile Fluid (so my Guide informed me, though I understood his Meaning but ill). These Carriages the infatuated Natives hold in such high Esteem, that they are blind to all the Evils attendant upon their Employment: for I was assured, that the Increase of Highways doth annually deprive the Realm of Cornland and Pasture equal to the tenth Part of a County; that their near Vicinity is rendered well-nigh intolerable by the Effusion of noxious Vapours, and the ceaseless Reverberation of the inward Parts of the Engines of Conveyance; and that these Molochs of the Highway devour annually, without Respect for Age or Sex, as many Persons as perished in the Engagements at Blenheim and Malplaquet. But all these Inconveniences are by the enthusiastic Populace deemed of very small Account, so be it only that Persons of ample Means may with all Expediency travel whithersoever Need or Whim demand.

I was informed also that there were anciently in this Land many noble Cities, diversified by the Splendour and Variety of their Edifices, both public and private; but of late the Rulers of the Kingdom have been at Pains to undo the Work of their Predecessors, by laying waste a large Part of each City for the Passage and Housing of Carriages. The Streets in particular are become very Rivers of Death, Cocytus and Phlegethon infinitely reduplicated; so that Mothers fear to give their Children Leave to go abroad unattended, and aged and impotent Persons need but leave their Dwellings, to set their very Lives at Hazard. Thus for this unhappy Land is the Prophecy of Nahum fulfilled, which he spoke against Nineveh: "The Chariots shall rage in the Streets, they shall jostle one against another in the broad Ways, they shall run like the Lightnings". And yet, this dolorous Fate is not the Work of barbarous and hostile Invaders; rather is it devised by the Government, and connived at by well-nigh the whole Populace, of this fevered and immoderate Nation.

Nicholas Gould



In the last decades of the 16th century, in the reign of Elizabeth I, some people with more money than imagination were claiming that England had never had it so good, or, in the more eloquent Elizabethan words of the Bishop of Salisbury, "never was it better . . . in abundance of victuals". Yet at this very time England was experiencing a ferocious rise in prices. The real situation was well summed up by the Elizabethan historian John Stow: "there was no want [lack] of anything to him that wanted [lacked] not money". In the last decades of the 20th century, in the reign of Elizabeth II, our situation is similar. If there is a surge of wage claims, it is not due to perversity or greed. It is simply that prices are rising even faster than they were in the days of the first Elizabeth. For most people, from the commuter to the pensioner, from the shopper buying a loaf to the young couple trying to get a house mortgage, the most immediately frightening fact of life in the later 20th century is the persistent fall in the value of money.

The cost of living in Britain by 1970 was about six times as high as in 1913, and about four times as high as in 1938. In the first quarter of 1970, manufacturers' prices were reported to be rising at a rate of 7 per cent per year. Some costs, notably housing and transport, are rising especially steeply, but virtually all kinds of costs are affected. In 1970 there have been rises or threatened rises in the cost of food and drink, fuel and light, council house rents and commuter fares.

POPULATION & INFLATION

by W. M. S. Russell

Economists generally conceive of population growth as a good thing. At the same time they are unanimous in their condemnation of inflation. Here Dr Russell shows that they can't have it both ways.

The wage/price race

Until the Second World War, wages in most occupations were rising even faster than prices, so that people in employment were generally getting higher and higher *real wages*—that is, they could buy more and more goods and services with their pay. Thanks to this, and to the development of social services since the war, our standard of living has risen substantially since Victorian times. In 1900, it was estimated that about 28 per cent of the British people were living in dire poverty; by 1960, the probable percentage had gone down by a half, to about 14 per cent. However, since the war, wages in many occupations, especially the lower paid ones, have begun to lose the race with prices, so that real wages have begun to fall. To judge from past experience, if the rise in prices continues, wages will lag increasingly behind prices, and the standard of living

for the great majority will inevitably go down. It is no wonder that prices and wages are always in the news, that one cartoonist (Cummings) has introduced the demon figure of Mr Rising-Price, that governments are more and more obsessed with Prices and Incomes Policy.

This is by no means a new concern of civilised government. It is probably the oldest concern of all. The earliest extensive code of laws is that of the city-state of Eshnunna in ancient Iraq, promulgated at the beginning of the 2nd millennium BC. This code begins with a list of fixed prices and wages, and some miscellaneous decrees on other matters are appended at the end almost as an afterthought.

Probably no government in history has been completely indifferent to the movement of prices and wages. But governments have varied in the degree of control they tried to exercise. At one extreme, the governments of classical Athens and Victorian England made very little attempt to control prices and wages. Both societies were enjoying exceptional trading advantages as the most advanced industrial states of their respective worlds. Most governments have tried harder to control prices and wages by legislation. But their regulations have been largely ignored, and prices and wages in such societies have generally gone their own way, rising and falling in great smooth waves.

At the other extreme, we find such highly regulated societies as the city-states and empires of the ancient Near East, or the modern Soviet Union. In such societies, the government itself is such a big spender and such a big seller that it is a major factor in the economy, and its regulations have some force. All modern governments have been increasing their expenditure, and hence moving in this direction. It is therefore important to realise that even governments of this kind can only exert a temporary control over price and wage movements. They can hold up a rise for a time, only to have it finally break through with a jerk: price changes therefore occur in sudden steps instead of smooth curves. As the historian Fritz M. Heichelheim put it, such a society has "a comparatively static economy with sudden periods of adjusting". During a single year of the reign of King Ammisaduga of Babylon (17th century BC) the price of barley doubled. In June 1962, the government of the Soviet Union was

In the long run, money is only a symbol of the relations between population and resources.

obliged to increase the purchase prices of meat and meat products by 35 per cent, since the supply of these goods was not adequate to meet the demand. They had held the prices constant for some time, at considerable loss to the government, but finally had to accept this sudden large price rise.

Money, Resources, Population

Since even the most influential governments can do so little directly by regulation and decree, the only way to solve the problem of rising prices is to understand and deal with the fundamental causes. When day-to-day changes in the prices of particular products are examined under the microscope of economic analysis, a bewildering variety of interacting factors appear. But we are not really concerned with these ripples, but with the great long-term movements of prices as a whole. These are best studied through the telescope of world history. When we do this, we find there are three fundamental factors involved: money, resources and population.

Prices are undoubtedly affected, in the short run, by the amount of money or credit in a society, relative to the amount of real resources and hence goods to be bought. When there is too much money about for the available goods, the value of money falls—in other words, prices rise. There are many examples in world history to show that prices rise when a large addition is made to the supply of money in a society, without a corresponding increase in goods. This happened when Alexander the Great captured the gold hoard of the Persian kings, and put it into circulation. It happened in the 16th century AD, when the Spaniards began to exploit the silver mines of Zacatecas, Guanejuato and Potosi in their New World empire. It happened in the 19th century, when new gold deposits were discovered in turn in California, Australia and South Africa. But in all these cases, prices were already rising, for other reasons. Moreover, at least in the long run, such changes must affect prices and wages equally, since the amount of money is increased relative to both goods and labour. If all goods cost twice as much, but all wages are also doubled, nothing has really happened. It is only when

prices rise faster than wages that real wages fall, and *vice versa*. In the long run, money is only a symbol of the relations between population and resources. The same principle applies when the amount of money or credit is reduced. If it is made more difficult to get mortgages, house prices may show a transient fall. But in the long run people *have* to have somewhere to live, and if the pressure of population on housing continues, house prices will soon rise again. This has been common experience in Britain in the past few years. The most fundamental factors of all are supply and demand—real resources and population.

The Population/Production race

The major price rises of the past have come about in this way. Population growth outstripped the production of some *essential* resource. Until the middle of the 19th century, this key essential was generally cereal grain, or the flour or bread made from it. Since demand exceeded supply, the price of bread rose. This meant that the *proportion* of income spent on bread had to increase, often drastically. It has been calculated that in February 1789 the price of bread in Paris was such that a factory worker would have had to spend 97 per cent of his income on bread alone. The result was that wages simply had to rise, and this meant that the price of other goods rose too, by a vicious spiral. But in these conditions the rise in wages lagged steadily behind the rise in prices, and the standard of living inexorably went down, especially for the lowest-paid workers, who in any case spent the largest proportion of their income on essentials. The very increase in population, which made prices rise, also kept wages from rising as much or as fast as prices. As well as too many mouths, there were too many hands. With a surplus of labour, wages remained as low as they could be without starving the labour force out of existence altogether. In these recurrent population crises, the problem was often accentuated by an increase in the frequency and destructiveness of wars. For warfare, by throwing part of a society's real resources down the drain, reduced yet further the amount of goods relative to the population, and so accentuated any rise in prices. Eventually, malnutrition and stress rendered the population vulnerable to epidemics, and there was a drastic fall in population. With re-

duced demand for goods, prices fell; with reduced supply of labour, real wages rose, and conditions improved steadily until the next time population outstripped resources.

This sequence can be illustrated in many times and places. In the ancient world, we can detect such trends in Babylonia in the 2nd millennium BC, in classical Greece, in the Hellenistic kingdoms, in the Roman and Byzantine Empires. In medieval and modern times, the process can be followed with more certainty and in more detail in many places, for instance in France, Spain, Italy, Germany, Sweden. In England, a careful study of prices and wages extending continuously over seven centuries has been made by E. H. Phelps Brown and Sheila V. Hopkins. From this and other evidence, we can construct in outline the course of events in England since the 13th century. Until Victorian times, apart from minor differences in detail, the story was very similar for the whole of Western Europe. The course of events in England from the mid-fourteenth to the early 19th century is summed up in the Table.

Medieval population explosion

During the 13th century, the population of England and Wales was growing fast. Some people think it even reached six million, a level not reached again till the 18th century. Certainly the production of cereal grains could not keep pace. People began to cultivate poor soil, and to concentrate on crops at the expense of livestock, with a loss in manure for the crops themselves. By the end of the 13th century, crop failures began, especially in the poorer lands, and production began to shrink. In 1315–17 there was a catastrophic famine, and throughout the 14th century a succession of epidemics reduced the population, till by 1400 it was little more than two million. The biggest of these epidemics was in 1348–9, the famous Black Death.

Because of the pressure of population on resources, prices increased throughout the 13th century, and well into the 14th, as productivity actually declined. Real wages fell, and people suffered increasing misery. The reduction of population in the 14th century changed the whole picture. Prices did not begin to fall till the 1370s. But wages rose spectacularly from the Black Death onwards, in some cases by as much as 200 per

cent. In 1351 the government brought in the Statute of Labourers to freeze wage rates at their old values. It was completely ineffective. Labour is like anything else: when it is in short supply, people are bound to pay more for it.

From 1380 to 1510, the much reduced population grew very little. Prices remained very constant, wages somewhat increased, so real wages rose to a high value: they never reached this value again until 1880. The great Victorian economic historian Thorold Rogers called the 15th century a Golden Age for the English people. But eventually, with much improved nutrition and a rising standard of living, the population began to increase again, and soon all the gains were being thrown away.

Between 1510 and the middle of the 17th century, prices increased about six-fold. Wages rose too, but not nearly so much, so that during this period real wages fell to half their value at the beginning. This drastic change is called by historians the Price Revolution.

Some early economists ascribed the rise in prices entirely to the import of silver into Europe by the Spaniards during the 16th century. In 1803, in the second edition of his great book on population, Thomas Robert Malthus swept away this hypothesis. "Depopulation", he wrote, "was loudly complained of at the end of the 15th and beginning of the 16th centuries, and a redundancy of population was acknowledged at the end of the 16th. And it was this change in the state of population, and not the discovery of the American mines, which occasioned so marked a fall in the corn wages of labour" (i.e. real wages in terms of the corn they would buy). Modern research has fully confirmed Malthus's view. Decades before significant amounts of silver began to be imported from the New World, prices began to rise, in parallel with population increase, in all parts of Spain itself and in France, England and Sweden.

In England and Wales, the population considerably more than doubled between 1510 and 1650, when it exceeded five million. In a recent history of the British cost of living (1969), John Burnett has shown that the whole chain of events occurred in two stages. Population and prices rose, and real wages fell, throughout the reigns of Henry VIII, Edward VI and Mary (1509–1558). In 1556–8, there was a very serious epidemic of "Sweating sickness" (possibly influenza), which may have reduced the

TABLE

| Year (AD) | Population* Millions | Price Index | Real Wage Index |
|-----------|-------------------------|----------------|--------------------|
| 1362 | 3 | 153 | 54 |
| 1400 | 2 | 104 | 80 |
| 1500 | 2 | 94 | 106 |
| 1655 | 5.5 | 531 | 56 |
| 1750 | 5.5 | 590 | 68 |
| 1820 | 12 | 1353 | 59 |

* Population of England and Wales, in millions, to nearest half-million

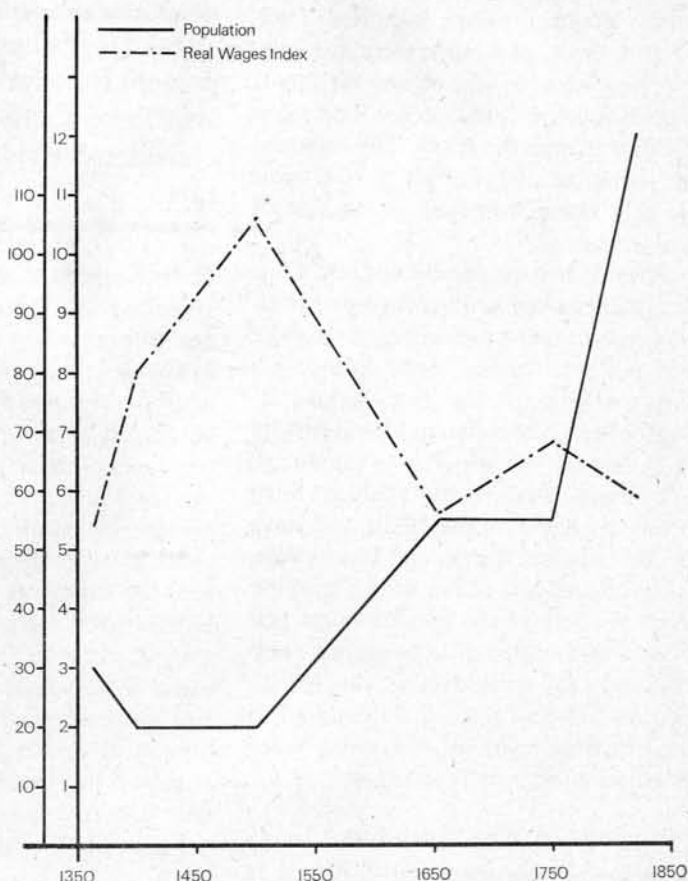
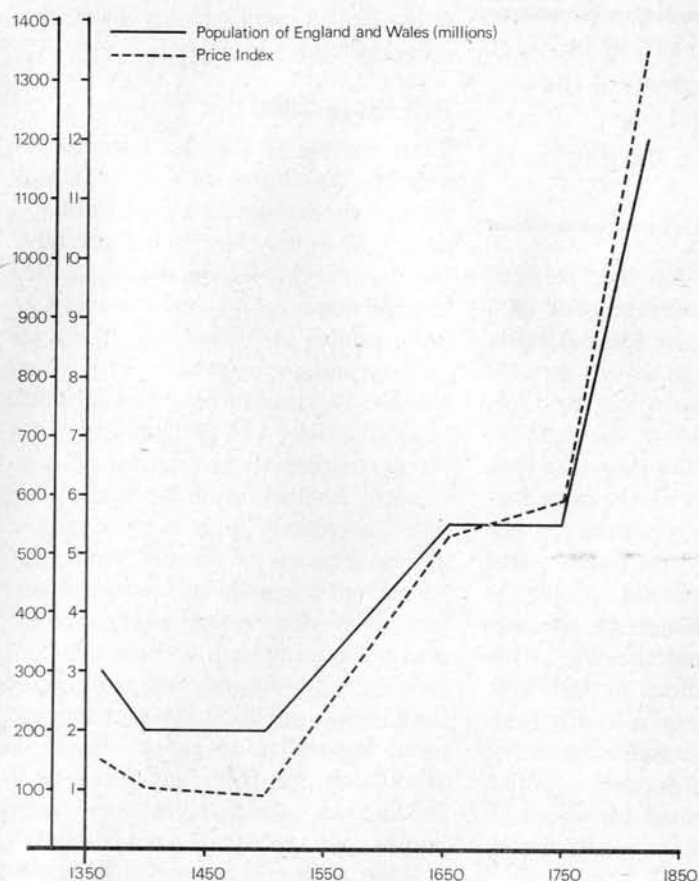
The population estimates for the earlier years are compromises between a number of different estimates, and very approximate. The census for 1821 gave 12,000,236.

The price and real wage indexes are taken from E. H. Phelps Brown and Sheila V. Hopkins. In each case, the average value for the years 1451–75 is taken as 100, and the values for other years are given as percentages of this value. The price index is based on the prices of a number of different goods, the real wage index is based on the values of building workers, expressed in terms of the amount of these goods they could buy at different times. The exact figures are not so important as the fact that they go up at some times and down at others.

population by as much as one fifth. Prices and wages stabilised for the next couple of decades. After that, the growth of population was resumed, and the price revolution continued until the English Civil War. The drop in standard of living was catastrophic. By the end of Elizabeth's reign, "almost half the population was hovering perilously close to hunger and destitution" (Burnett). In the early 17th century, malnutrition became widespread and the vitamin deficiency disease of rickets made its appearance. The weakened population was subject to a series of epidemics, of which the Great Plague of London in 1665 was the worst.

Population and price stability

Because of malnutrition and disease, but also because people now began to use birth control on an extensive scale, population remained almost stationary until about 1750. Accordingly, throughout this period, prices remained stable and wages rose somewhat, producing a rise in real wages and in the standard of living from the very low levels of the mid-17th century. Agriculture made great advances. Without much machinery or any agricultural chemicals, it was



becoming capable of supporting a considerably larger population than in medieval times. Nutrition improved, and wheaten bread (as opposed to barley or rye bread), hitherto a luxury, became a staple food at least in southern England. Along with nutrition, health improved and infant mortality began to decline. Finally the country entered another period of rapid population increase, more than doubling again by 1820, when it reached 12 million.

This new population increase, from 1750 to 1820, had all the old consequences. Prices more than doubled, real wages fell back to their 17th-century level. Under the population pressure, cultivation again spread to poor land, "though the use of land which was unsuitable for crops under normal conditions only forced up prices further" (Burnett). The population crisis in Europe had culminated in the Napoleonic Wars which, through waste of real resources, also pushed up prices. The misery of the British working classes was extreme. This was the period in which Malthus drew the attention of the world to the whole problem of population pressure, and in which Francis Place began to urge the workers to use

contraceptives, in order to reduce their population and thus increase their bargaining power. In the long run, as he observed, "every suggestion which does not tend to the reduction in number of the working people is useless".

From about 1820 to 1945, a whole set of new factors came into play. Malthus had foreseen them, and had rightly warned that they were unique and would not recur again. Population continued to increase throughout the period. The rate eventually fell considerably, but towards the end of the period the absolute number of the population was so large that even small percentage increases meant the addition of large numbers of people: the absolute increase between 1911 and 1951 was greater than between 1801 and 1841 (nearly eight million compared with nearly seven million). By 1951, the population of England and Wales was nearly 44 million.

Despite this staggering population rise, prices actually fell on the whole until the First World War; by that time they had got back to the level of the late 18th century. By that time also, real wages had more than doubled since 1820, and were higher than they had

ever been before, even in the 15th century. Both the World Wars were accompanied by unprecedented price increases, but real wages continued to rise until the Second World War. It is only since that war they have begun again to lose ground.

Farming the New World

This new turn of events was made possible by several developments. In the 19th century, Britain became the first industrialised nation in the modern sense, and long maintained her lead in the new industrial world. People sometimes imagine that industrialisation in itself will make possible a large increase of population. This is magical thinking: you cannot eat machine tools, however many you make. British industrialisation made possible a large increase in British population because simultaneously vast new lands were opened up for crop agriculture—chiefly the prairies of North America, ploughed up with the help of the new steel ploughs. By the 1850s, Britain was importing nearly a quarter of her wheat, by the 1870s more than half, paying for it by the export of manufactured goods. Raw materials other than food, and luxuries of all

kinds, could now be imported from abroad. Great new lands were available for emigration, to take off any surplus of labour. By the 1860s, it was becoming difficult to man the Navy. The standard of living of the British people was steadily rising, reflected in the rise of real wages.

But this bonanza could not last. Classical Athens had lost her favoured position when other peoples began to make fine pottery. Britain began to lose her favoured position as other nations industrialised. She began to have difficulty in paying for her imports—what we call a “balance-of-payments” problem. Such problems began in the 1930s, and have multiplied since the Second World War, with the final loss of the British Empire. With the loss of the special world privileges that buffered them against price rise and real wage decline, the British peoples are now once again exposed to the penalties normally incurred when population outstrips resources.

Housing—a Key resource

As a food-importing country, Britain is now extremely vulnerable. But her food supply is still adequate. Ever since the industrial revolution got under way, the key essential resource in Britain, constantly outstripped by population, has been **housing**. The rapid growth of industrial towns in the early 19th century produced an immediate housing shortage, and the ground then lost has never been made up. All the work of the Victorian charitable trusts, clearing slums in London from 1845 to 1875, was sufficient to house only six months of London's population increase; the demand today is, of course, far greater. In 1970, with births still exceeding deaths by 800 per day, a new city the size of Leeds is needed every year. Rents rose steeply all through the 19th century, and in the past 50 years housing costs have probably increased 10 or 15-fold; “the most important single price-change in the period is, no doubt, in housing” (Burnett). Council house rents had by 1969 risen about six-fold since the 1930s. Since the Second World War, housing costs have rocketed, in part because of the varied pressures of population density on land itself. The price of agricultural land in southern England doubled between 1962 and 1964. The cost of building-land in London rose about seven-fold between 1951 and 1963. Between 1960 and 1970, the price of a new house, including the cost

All the ingredients could be present for a reduction of the British population by a considerable rise in the death rate.

of land, more than doubled; between 1969 and 1970, the average price of a new house rose by some £300. Already in 1900 it was estimated that 11 per cent of all expenditure was on rent. By 1965, among the lowest-paid workers and the pensioners, housing, together with fuel, light and power, made up the same percentage of family expenditure (31 per cent) as food itself. It is thought that growing numbers of old people in Britain die each winter of diseases associated with “underheating”, because they cannot afford enough fuel. For many working people, as a by-product of urban development, commuting transport has become another essential, and transport accounted for about 10 per cent of all personal expenditure by 1965.

In earlier periods, high food prices had several results. They regularly led to demonstrations and riots. At times, in 18th-century England and France, these took relatively restrained forms: bakers and millers were forced by indignant crowds to sell at prices considered reasonable. The modern analogy could be some form of popular rent control by squatter groups. More serious riots were, of course, common, and the incidence and severity of riots have been shown to correspond closely with the occurrence of high food prices, in France in the 18th century, in Japan in the 17th to 19th centuries, in England in the 16th, 18th and 19th centuries. A modern equivalent would be the occurrence of serious housing riots, not yet seen in Britain. All this, of course, makes up the background of the more serious civil violence and war that forms part of every population crisis.

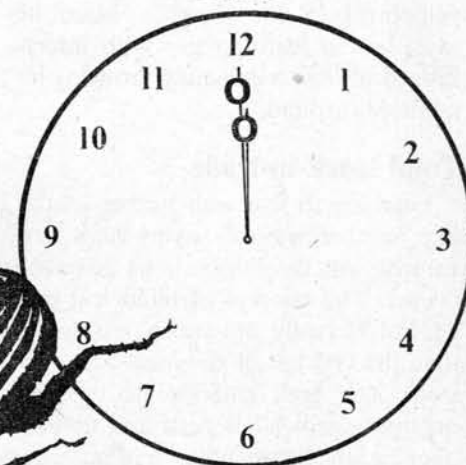
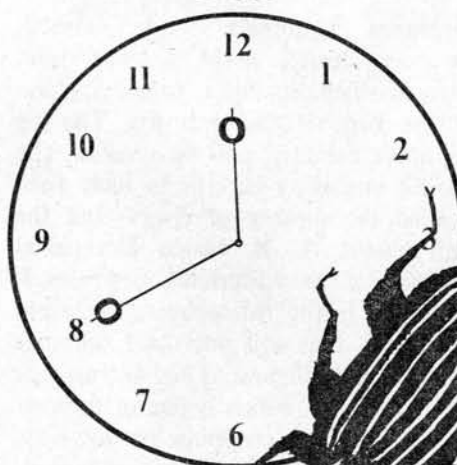
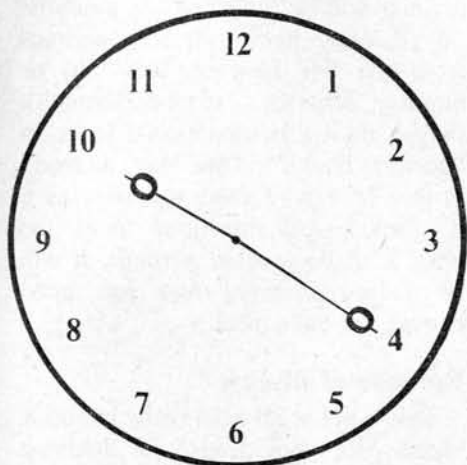
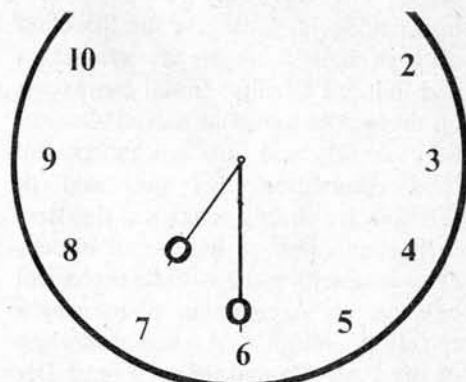
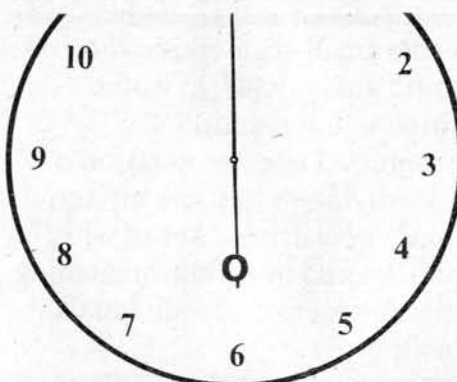
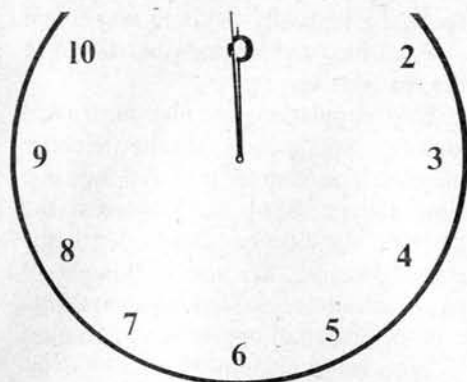
Food shortage has also regularly led to malnutrition, vulnerability to disease, and hence to high mortality in epidemics. The stresses of crowded commuting, the stresses and sanitation hazards of crowded and inadequate housing, could obviously have similar effects, in a society where population pressure is already placing a severe strain on health and sanitation services. All the ingredients could be present for a reduction

of the British population by a considerable rise in the death-rate.

Britain in 2000?

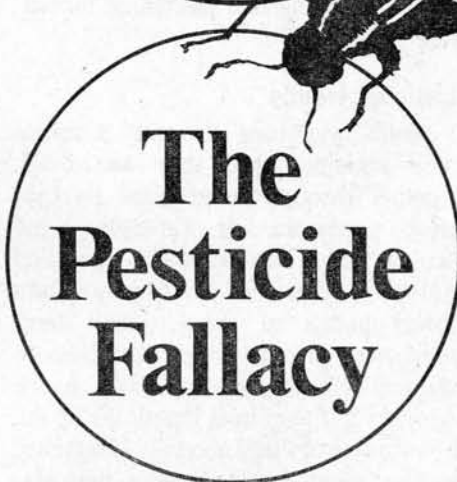
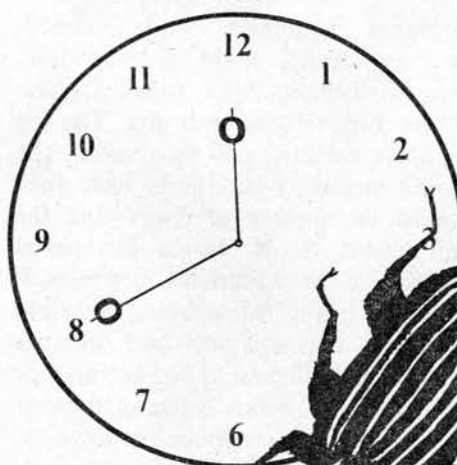
What are we to do about prices and wages? We have seen that simple decrees about price levels, and manipulations of money, are both ineffective. What about increasing the production of real resources? Certainly we need more houses at present. But there are overwhelming objections to what Edward Goldsmith has called “the cult of productivity” in general. First, for purely mathematical reasons, no conceivable production of goods can keep pace indefinitely with even a modest natural increase of human population. Second, it is equally impossible to sustain an ever-increasing market for export products. Third, considerations of exhaustion of resources and pollution of the environment are making it more and more imperative to *reduce* industrial production, far from increasing it. In Britain, we cannot build many more houses: we are running out of land.

What, then, will become of Britain by 2000? One thing is certain. Population and prices will not continue to rise for the next three decades. By the turn of the century, either the death rate will have risen—or the birth rate will have dropped. For there remains the solution of Francis Place—voluntary birth control—supported by generous government provision of education, information and facilities. Such a policy will more than pay for itself, almost from the outset. A voluntary birth control programme, started in Mecklenburg County, North Carolina, in 1960, is estimated to have saved a quarter of a million dollars in welfare payments within three years; the operating expenses totalled one twentieth of the savings. In the past, substantial reduction of population growth, even the cessation of population growth, have resulted in rising real wages and a rising standard of living. We do not need the horrors of a Black Death to achieve this. No doubt we shall need much skill and much research to take the fullest advantage of the opportunity so provided. But the opportunity will be there. For many millennia, in the words of H. G. Wells, mankind “spent the great gifts of science as rapidly as it got them in a mere insensate multiplication of the common life”. It may well be that by 2000 mankind will at last begin to use and enjoy those gifts. In Britain and all over the world.



If, by some similar compression, man's consciousness during his total period of existence is also represented by a 24-hour day, another significant emergence is seen to have been delayed until a few seconds before midnight—dawning realisation of his own terms of existence on the planet. Although he has achieved wonders denied to all other species, they have one vital quality at least that he has not. They know their place. He on the other hand has come down the ages breaking the rules with abandon. He has been so ignorant of his ecological status and responsibilities that it is as if bandages had been placed over his eyes.

Very late in the day, concern is mounting to combat pollution of the environment and to conserve what is left of nature. Interest in these matters, however, has taken so long that the necessity for hard thinking and drastic action is cruelly pressing. In the meantime, established habits of thought, as well as obsolescent institutions, are proving formidable obstacles. The crisis is particularly acute in the field of what is misleadingly called "pest control", which is in the unhappy position today of being urged to proceed in two entirely different directions simultaneously. On the one hand it is cautioned to ease off, on the other it is urged to redouble its efforts. It is charged with killing off both harmful and harm-



The Pesticide Fallacy

by Roy Bridger

On a time-scale represented by a 24-hour day, it took the first 7½ hours of the earth's history for emerging life to break through into the earliest known forms, primitive bacteria and algae. The first half of the day passed. The second half had nearly passed when, at 22.20, the reptiles appeared. At 23.40, with only 20 minutes left, they were joined by the mammals. Just 40 seconds before midnight, man emerged.

less organisms indiscriminately, polluting the environment and poisoning the consumer into the bargain. Yet it is also warned that more and more hungry multitudes will be relying on it to ensure safe delivery of their food crops.

Progressive intervention

While man is obliged to keep the world's biological fabric as a whole intact in order to safeguard the basis of his own survival, he is also forced to terminate the lives of some individual plants and animals so that others more favourable to his programme may live. Until comparatively recent times, his activities in this direction made little serious impact upon the world's biomass, but today it has become frighteningly the opposite. From small-scale elimination of *some* individuals in *some* species, intervention has progressed to extermination of *all* individuals in *some* species, and is now driving ahead with policies and methods threatening the existence of all individuals in *all* species.

A dangerous situation, with undertones of dire irrevocability, has now arisen in consequence of the latest moves to overcome the insects' latest moves—the emergence of strains resistant to insecticides. Natural selection is a constant, and it therefore follows that development of resistance is inevitable. The orthodox approach, hitherto content with searching for more potent

insecticides, is turning in the direction of such baleful agents as irradiation and induced sterility. Initial campaigns on these lines aimed at partial elimination could add up to successful total elimination, but successes of this sort are simply ecological disasters in fleeting disguise. Misuse of insecticides is upsetting the world's ecological balance, an Argentinian plant geneticist, José Vallega, told a recent meeting of the FAO Committee on Forest Development in the Tropics. Man, he says, has to learn to live with insects instead of indiscriminately throwing insecticides around.

Total stock-in-trade

Learning to live with insects sounds like another way of saying biological control, but the implications go much deeper. The concept of biological pest control is really not much less faulty than the concept of chemical pest control, since both embody the idea of organisms which are pests and nothing else. Nature knows nothing of such entities. It is quite unrealistic to visualise a crop for human consumption as the one worthwhile constituent to be snatched defiantly from enemy territory. The component species of an ecosystem advance together. They would not advance otherwise. It is the total stock-in-trade that counts.

In relation to the physical environment and to climatic conditions, the ecosystem strives to establish itself to the *best* advantage, not the *worst*. On the exposed island of Grassholm, in the Bristol Channel, nature unaided has used the restricted vegetation available so successfully that "over the centuries it has formed a soil rich in organic matter which is so soft that a man sinks into it at every stride". (E. M. Nicholson, *Britain's Nature Reserves*) The most powerful organisms for increasing the total weight of the biomass are trees. On the mist-clad Pacific slopes of Oregon, luxuriating in an annual rainfall of 140 inches, stands the climax-growth Olympic rain forest, believed to contain the greatest weight of living matter per acre in the world.

Yet forests do not consist entirely of trees. A forest is a social organisation, the component members of which depend on one another. Conversely—and this is where human interference is apt to be to the *worst* advantage—without a social organisation there can be no forest. The forest community

From small-scale elimination of some individuals in some species, intervention has progressed to extermination of all individuals in some species, and is now driving ahead with policies and methods threatening the existence of all individuals in all species.

includes mammals, birds, insects, worms, shrubs, herbs, grasses, fern, mosses, lichens, algae, fungi, mycorrhizas, bacteria and protozoa. The big support the tiny, and vice versa. The forest is mighty enough to have been called the mother of rivers—but the mycologist A. B. Hatch has called mycorrhiza the fostermother of trees. It is down in the rhizosphere, the world of roots, that soil microbial densities are at their highest. They increase as the roots age, which is one of the reasons why, for cropping productivity, there is nothing like ploughing in mel-low turf.

Uses of weeds

Some organisms do not complete their mission until they are dead, whether through being eaten by top-level predators, or through being broken down into humus by low-level soil micro-organisms. Here again, established habits of thought and hazy semantics are proving obstacles to rationalising intervention. The havoc wrought in the animal kingdoms by the non-science of "pest control" is matched in the plant world by the depredations of "weed control". The wry definition of a weed as simply a plant in the wrong place is beautifully exact—from a human angle. It is the place, not the species, that is wrong. Yet at the same time, by habitually giving the term "weed" a derogatory significance, we contrive to blame the species for existing at all.

Our judgement may be further at fault: the offending plant may be in the *right* place after all. Dandelion, daisy and corn marigold are able to flourish on acid soils, yet they are rich in lime and so contribute to its accumulation on the spot. Many weeds have a high mineral content, which explains their selection by grazing animals. Cattle and sheep died in large numbers in New Zealand on pastures treated with herbicides to rid them of such

species. Eventually the cure was found—by turning the animals out to graze the roadside verges.

Wild populations are also mistrusted under the supposition that they harbour disease. The charge is a red herring, since the operating factor here is the morbid significance attached to the term "disease". Disease is thought of as an absolute, an independent kingdom in perpetual opposition to another independent kingdom—health. An individual will be "attacked" by a notorious disease, newly arrived, perhaps from the Far East (Asiatic 'flu) or South America (foot-and-mouth), though until then understood to be in "perfect health". One day a seedy broiler in a wire cage will pass as a fit provider of nutritious food; the next, a shade seedier, perhaps, it will be judged diseased and not good enough for cat's-meat.

Purpose of disease

This is not at all what really happens. Nature does not destroy in lightning flashes. It is simply that earlier warnings pointing to faulty conditions go unnoticed. Whether for cabbages or coconuts, maggots or men, conditions favourable to the species must be present. If they are not...

Beneath the outward pageantry of life, is the inner mechanism of decline, death and decomposition. It is this which governs the ebb and flow of disease and pest activity. The iron immutability of individual mortality demands that all have to die when their time comes, surrendering their materials as stepping-stones for future generations to cross into life. When that time comes, nature's disposal squads are not long in moving in. How else could it be done? Materials for new individuals have always been wanted, while some means were needed for getting rid of dead ones. What happened was that the two processes were dovetailed together—a stroke of genius.

It is sometimes rashly asserted that the ultimate aim of pest control is the complete elimination of all diseases and pests. Never in this world. A certain percentage of control, of necessity. But 100 per cent would call for an infinitely accommodating environment in which no individual organism was ever subject to decline and death, in which conditions were equally suitable for all species and all individuals at all times.

The concept of biological pest control is really not much less faulty than the concept of chemical pest control, since both embody the idea of organisms which are pests and nothing else.

Man's realisation of his terms of existence has still stopped short of recognising the startling truth that he does not exist as an individual, in the real sense of the word. A person who has allowed an ailment to develop is apt to remark that he "must have picked up a germ", unaware that from the moment of his birth he has been carrying millions of micro-organisms on his person. Dr Theodor Rosebury, Emeritus Professor of Bacteriology at Washington University, St Louis, gives this two-edged summing-up of the situation in his book *Life on Man*: "Generally speaking, the normal microbes do not damage the host if he is not already damaged in other ways, it being understood that interaction between the two never ceases while both remain alive." But let damage, however slight, occur, and your microbes will have moved into an extra stronghold.

Degree of resistance

For the greater part of the run, however, it is not disease that wins points, but the degree of resistance to challenging conditions. In nature the apparatus of removal is discreet and unobtrusive. The long-term geological and climatic cycles at the outer limits of life swing so slowly that species have time to gain optimum terms. The creatures of the wild are not given to fading away halfway towards their potential life span. No need for insecticides is visible on the great kauri pines of New Zealand, with generation slowly yielding to generation amid the silence of a hundred centuries. The arctic tern, coasting across the world in its wondrous migrational flight between the northern and the southern polar regions, is not given to collapsing out of it like an obese businessman hurrying to keep his last appointment.

Disease organisms, too, are under the necessity of keeping in good health. In their natural state, bacteria are accustomed to fresh nutrient supplies and the removal of wastes. Laboratory research on disease, confined as it is to test-tube bacteria which may them-

selves be subject to deficiency diseases, thus flounders in the worst of both worlds.

In general it is the biologically rich and varied community that possesses the most buffers against pest attacks—or in food production terms, mixed farming, with crops and livestock flourishing together, instead of languishing and dying in isolation; with mixed-crop production integrated with mixed-animal production, and with all food production integrated in turn with tree production and the rest of it. No insecticides are needed to maintain a tropical rain forest, though there is no shortage of insects.

In the long equable heyday of the human race before the machines took over, agriculture was able to achieve its happy flowering. Today it has lost its men, lost its soil fertility, lost its soul. Natural retaliation is closing in on a scale never before experienced. Remote control farming seeks to defend its ever more vulnerable monocultures with ever more determined pest control campaigns. On these lines, nature could be obliterated altogether. But it would be a Pyrrhic victory. Moby Dick would go down—but taking the Pequod down with him.

Monocultures for megalopolis

In recent years efforts have been made to achieve less disruptive control through the encouragement or introduction of a pest's natural enemies. It is not the case, the line of approach reasons, that swarms of new parasitical organisms have come into the world, simply that advances in transportation have made many of them new to us. Sometimes, an invader's own natural parasites and predators arrive later. How about giving them a helping hand?

Two years after a batch of Australian ladybirds were imported into Californian orange groves to combat cottony cushion scale, this serious pest had been almost eliminated. To fight the balsam woolly aphis, massive infestations of which can injure trees so severely that they die in two years, the Canadian Department of Agriculture imported 200,000 *aphidletes thomsonii* flies from West Germany and Czechoslovakia, and a quantity of *laricobius erichsonii* beetles from West Germany. The Hawaiian sugar industry goes so far as to claim that all pest troubles have been eliminated by bio-

Man's realization of his terms of existence has still stopped short of recognising the startling truth that he does not exist as an individual, in the true sense of the word.

logical means. Time will show whether the situation stays put. The sugar industry does not practise rotational cropping. It has only sugar to rotate. Where there's mono-life, there's always hope for pests.

Ring the changes, however, if only just a little, and the atmosphere of uneasy truce gives way correspondingly. In Peru it has been found that the best way to control a certain caterpillar attacking cotton plantations is to plant adjacent land with maize, which harbours the caterpillar's natural enemies.

But on the whole it is difficult to see introduced predators, however beneficial, making things safe for remote-control megalopolis. With immense human populations crowding into cities, the fields are left deserted save for the giant machines believed to be coping. The illusion is charged with peril. The machines can tackle only what they understand, which in terms of biosphere management is not much. Their own fuel supplies are strictly non-renewable and liable to be commandeered at virtually a minute's notice by the exploding machine populations of the world. What then? Should nature rebel in strength, what skilled hand among the stricken multitudes will undertake to put things right?

Nature's censors

Where conditions are *not* favourable to a species, nature's censors are soon on the scene. In the present war of the machines versus nature, with massive concentrations of the only genuine pest nature has ever faced packed helplessly under fire from both sides, tactics have deteriorated into open savagery. In the savanna regions of Africa the weaver bird, *quelea quelea*, has been laying waste to cereal monocultures on a scale comparable to the ravages of locusts. Individual flocks contain millions of birds. Flocks were decimated by explosives and flame-throwers, but the casualties were quickly replaced. Then aerial spraying of roosts with parathion led to the birds dispersing over wide areas, leaving their dead

Remote control farming seeks to defend its ever more vulnerable monocultures with ever more determined pest control campaigns.

bodies to poison vultures and other predators, with rotting carcasses on all sides.

Australia's main crops are almost all cereals, chiefly wheat, of which the country is the world's fourth largest exporter. But cheap flour for the multitudes is not being wrested from the dry island continent without trouble. Kangaroos started laying waste to the precious monocultures on a scale comparable to the ravages of the weaver bird. Thousands of miles of fences were built, but the kangaroos went over the top. Farm patrols armed with rifles went into action. Two shillings a head was given by way of incentive, and even at this rate some marksmen made up to a £100 a week. Today action is being urgently called for—to stop the cats and dogs of the world from being fed on the last of Australia's canned kangaroos.

Irreplaceable species

Should the kangaroo be harried into leaping out of existence altogether, the loftiest of exhortations will be unable to conjure it back. All present species are irreplaceable. With the disappearance of their manifold precursors through natural selection, the stepping-stones by which they crossed into existence have been swept away. It is exactly *because* they came this way, and no other way, that they are what they are. In this longest-run drama the players are always seen at their best. They have their parts to perfection, having been schooled in them by stage directions written into nature's fourth dimension—time. Butterflies flutter, hawks hover, bears hibernate, all at the prompting of age-old cues. Conversely, what you *see* is hardly the butterfly at all. Take away its instincts—to appear at the time when its kind have always appeared, to flutter (on much the same course as its predecessors followed, last year, last century, before Stonehenge), and so on—and what is left is practically worthless.

Our fellow species have been many million moons on the way, but some of them are sliding towards the edge. A little more, and everlasting night may

overtake them. Do we have to give them the final push? What if we wanted them back—too late? We can never be sure what human life-lines a doomed species may be taking into oblivion with it, but we can be sure that technology, whatever else it can do, will be powerless to refashion it. It might contrive by some at present unimaginable dexterity to rig up something resembling, say, a meadow pipit, but it would never manage the way it runs (rather than hops). It would never time the building of the nest to suit the cuckoo (which perhaps arrived within hours of it) waiting on the spot to lay its egg therein.

Ecological Marshall Aid

Thus those who pick off the harassed remnants of a threatened species are engaging in something which is like no other earthly activity. A wildlife magazine reprints, without comment, a news item in a Maltese newspaper headed "Shoot of a Century". A local sportsman has shot a "rare bird", thought to be a short-toed eagle. It is believed to be the largest bird (wing-spread seven feet five inches) shot in Malta for 100 years. The sportsman, it is added, "spends most of his free time hunting wild birds, mainly to add to his collection". If this is what we indulge in just for fun, we are in no frame of mind to weigh the destinies of those luckless species labelled pests. Yet the risks are without parallel. In a natural community, exploding populations threatening the stability of the rest are quickly brought to heel by predators. The predators themselves do not get the chance to explode. But take away the governing machinery, remove nature's central turbines—and what exactly is left? Man the supreme pest, the last predator, blindly feeding every stick and stone into his "production" machines, ready to convert even the leaves of the trees and the grass under his feet into "supplementary protein".

Sir Albert Howard, who saw very deeply into these things, summed up the prospects thus: "Nature will always beat politics." Man is no conqueror of nature. He is simply part of an economy running on photosynthesis and policed by its tiniest inhabitants. How they go about it is their business. The so-called pests themselves have their own sub-communities of parasites and miscellaneous joint adventurers. Ant settlements carry various uninvited

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guests, some of whom earn their keep as scavengers. One Asian midge obtains blood from the body of a gorged mosquito, instead of directly from a vertebrate host. A borborygid fly has come down the ages riding on a dung-beetle.

We speculate about taking over the running of nature, but exactly who is going to superintend such activities as these? The only feasible way of going about it is to make full-scale ecological Marshall Aid available to the underdeveloped species, giving them the kind of help which will enable them to help themselves. Before the manifold species establishing the balance of nature can fight it out, the life-giving properties of the supporting earth itself must be available at full strength. Apart from the gross disruption of nutrient cycles caused by machine technology, declining soil fertility (and ultimately erosion) is man-caused. Throughout the world one of the most vulnerable points in the economy of food production, both on and off the farm, is failure to handle organic wastes efficiently. Tentative murmurs are now being heard about recycling tin cans, but it is of little consequence that we should get our tin cans back again if our living ecological props are starved out of existence. The human race cannot continue converting the stored nutrients of millennia into ocean-going sewage indefinitely. In agricultural practice too, we are farming for a collapse, with virtually the whole of the emphasis on extraction without regard for return.

The other main means of aid is the restoration of tree cover. Trees are nature's great all-rounders. Without photosynthesis, solar energy cannot be caught and held. The two main sunlight-trapping forms of vegetation are trees and grass, in that order. Pioneer farmer-foresters today speak of "three-dimensional farming," but nature thought of that a long time ago.

Simultaneously with moves to restore soil fertility, every encouragement must be given to policies helping human beings to fit into the picture to more stable effect. We have to do something about the monocultures. What do we do about megalopolis?



St George Mivart

Ahead of their time

by G. N. Syer

An account of two far-seeing
Victorian conservationists



Wilfred Blunt

St George Mivart (1827-1900) and Wilfred Blunt (1840-1922) men of letters and science, conservationists and determined opposers of social Darwinism, were spurned by their contemporaries and have been neglected by posterity. Many of their ideas were ahead of their time and are only now becoming widely accepted.

It is a commonplace that before ecology emerged as a separate discipline the principles it embodies were implicit in Darwin's theories. A realisation of the interdependence of living things and their subtle integration with their environment in the "web of life" led Darwin to form his concepts of natural selection and the survival of the fittest, concepts which have had such profound effects on the course of human thought and society. The word "ecology" was not Darwin's; it was coined by Haeckel in 1871. Had Haeckel been less influential and the now almost totally forgotten St George Mivart more so, 20th century conservationists would now be

working for a better recognition, by politicians, industrialists and the public, of the "hexicological" principles upon which life is based—and there would, incidentally, be copies of a monthly magazine called "The Hexicologist" now on sale on the bookstalls. For Mivart, apparently—and surprisingly—in ignorance of Haeckel's word, proposed "hexicology" for what we now know as ecology.

Mivart was one of that tortured band of Victorians (Tennyson was another) who found themselves torn between the conflicting claims of traditional religion and those of the emergent sciences, notably Darwinian biology. A convert to Catholicism at the age of 16, he spent his working life as a biologist, attaining some distinction as a writer of works on zoology. Apart from his strictly biological books he also wrote a series of works which attempted a reconciliation between the scientific conception of the universe and the religious. The struggle to reconcile the two grew more and more difficult for him; in the end his religious convictions lost, and he died excommunicated by his church. His most important book was probably *Nature and Thought*, in which he tried to harmonise,

on an epistemological basis, the facts of science and the values of religion. He intended to write a series of books, each of which was to be devoted to a single animal typical of its kind and described in its hexicological setting. It was to end with a volume on Man. Unfortunately the scheme was never carried out, only one, *The Cat*, ever being completed. If he had finished the project and written on Man as an ecological animal, his fame today might have been considerable, for such a book written in the 19th century could well have changed the course of society. We lack a complete study of this kind even today.

To his modified Darwinist view of the struggle for existence Mivart brought, from the other side of his divided nature, an intense aesthetic appreciation (and thus a conservationist attitude) of the beauties of natural things. In *Nature and Thought* he finds in the complex inter-relations of animals and plants not only beauty but also a certain goodness "which is conducive to an end beyond itself, the conservation of the world's vigorous life and the intellectual and aesthetic development of its noblest denizen, Man". But the handiwork of Man is often

hateful and mars that of Nature. "Let a new land be discovered," he writes, "with a peculiar fauna and flora full of scientific interest, and straightaway the European purposely introduces his thistles, his sparrows, his rabbits or his goats, and the harmonious balance which has resulted from the organic interplay of ages is at once destroyed. Downright evil is often the result. Forests are recklessly felled, and arid, rainless wastes or dismal fever-laden swamps ensue." And he goes on to deplore the consequences of Man's thoughtless abuses of his environment.

Not that he thinks all Man's interference with Nature is ugly or bad. Man forms in one sense a part of Nature and his works when in themselves not inharmonious augment the beauty of their surroundings. In the past they have often done so; and Mivart cites the Greek temple and the Gothic castle as buildings which improve the landscape. He anticipates the tenets of the Bauhaus school when he suggests that when a building exactly expresses the purpose for which it is intended then it will be considered beautiful. And he anticipates Smuts' holism in his view that perfection in human conduct consists in the establishment of harmony, within and without. Art, Nature and moral goodness have their common roots in such harmony.

Influenced by Mivart but very different from him in background, personality and experience, the poet and traveller Wilfrid Scawen Blunt (1840-1922) opposed, as Mivart did, the currently fashionable application of Darwinian principles to human social and political life. "The survival of the fittest" provided, in the late 19th century, a dubious scientific and philosophical basis for *laissez-faire* economics and for British imperialism. Millionaires like Carnegie justified their wealth by appeals to such social Darwinism, and it often lay open or concealed behind the imperialist tendencies of politicians like Arthur Balfour.

To all this, Blunt was implacably opposed. With his intrepid wife, a granddaughter of Byron, he had spent much time travelling among Bedouin tribes in Arabia and he had come to have, like others after him, a profound respect for those peoples and their ways of life. Although a Tory in other respects, Blunt loathed the attempts of Britain and other Western nations to impose a dull industrialised conformity

upon independent and beautiful cultures that had as much right to exist as the debased and materialist societies of Britain or America. Despite his personal friendship with many of the political leaders of the day—he was a wealthy Sussex landowner and thus was regarded as a member of the ruling class—he fought energetically for Egyptian and Indian independence. Nearer home he took part in the Irish Home Rule movement, claiming to be the first Englishman to be sent to prison in Ireland for the Irish cause.

Blunt put forward his views in a series of published diaries and political works that, regrettably, have been long out of print. In his *Land War in Ireland* he attacks social Darwinism. Although he has believed in Darwinism since 1861 he denies that its principles can be used to justify the killing of coloured peoples. In the animal world the survival of the fittest is not between species and species (he is surely not quite correct here?) but between individuals of the same species. In any case endurance and adaptability, and not ferocity and brute force, are the qualities which enable individuals to survive. Despoliation and extermination are essentially human, the products of a vitiated intelligence. In Nature, apart from the human race, there is a world of mutual concession and unbroken peace.

His attack on social Darwinism and on the destruction of the world by industrialism is based partly on ethical and partly on aesthetic principles. The natural world, he says, is everywhere beautiful, healthy and happy—happiness being defined as suitability to surroundings. In his view the insistence of any race to usurp more than that limited space in the world for which it is best fitted is an unjustified and insolent pretension. The world would be a poor mis-shapen deformity if it were planted from pole to pole with a single crop of wheat. And it would be valueless if the Anglo-Saxon races succeed in spreading over it their debased industrialism, their crude cookery and their flavourless religion.

In his poem *Satan Absolved* (1899) he returns to the attack, more trenchantly this time. Satan pleads with God to be allowed to return to heaven since his crimes are so much less bad than those of Man, that "lewd bare-buttocked ape". Man has ruled as a pitiless lord of the animals,

*And daily he destroyeth. The great
whales he driveth
Beneath the northern ice and quarter
none he giveth
Who perish there of wounds in their
huge agony.
He presseth the white bear on the
white frozen sea
And slaughtereth for his pastime.
The wise amorous seal
He flayeth big with young.*

He is destroying the great herds of animals. He is destroying species of birds so that women can decorate their hats. Even the Pope spends his leisure catching birds. The smoke of Man's industry broods over the earth like a black pestilence. His refuse poisons the soil. Streams and rivers are becoming sewers. His presence makes all unclean. Thus Satan arraigns Man with all those atrocities against the world, against God and against Man himself with which we in 1970 have become so familiar.

No one would claim that Mivart and Blunt are great and original thinkers. Yet perhaps more clearly than most of their better known contemporaries in science and thought they foresaw the direction that 19th century civilisation was taking and the destruction that it was even then bringing about. At a time when others were brimful of confidence in "progress" they saw the terrible price that Man was paying. Today, even more than in their own day, they have a message for those who cannot see what unrestrained technology and unrestricted population growth are doing to the earth. We need, more than in Mivart's day, a comprehensive study of Man as an ecological animal. Social Darwinism is still with us; most of us have heard the argument, an argument both lunatic and cruel, that we need not worry too much about pollution as Man will evolve sufficiently to cope with it.

The destruction of wildlife still goes on, less deliberately now but no less thoroughly. The ecology of politics that Blunt adumbrated is a study which seems to be vitally necessary to us (witness, to take one example, the Arab-Israeli conflict which was born, partly at least, of population pressure and ecological imbalance). Many of their ideas were ahead of their time and are only now becoming widely accepted. It is time we gave these far-seeing Victorians, neglected for so long, their due.

Reports

Open letter to the N.F.U.

What will farming be like in the 1990s? The public is aware of some of the financial problems besetting farmers and the farming press sees the crisis in agriculture entirely in economic terms. It may well be that the present situation has been brought about by the economic framework within which farmers must operate, but a satisfactory solution will call for more than higher pay for farmers themselves, or wider profit margins for their enterprises.

The National Farmers' Union represents the majority of British farmers and it exists to serve their best interests. At present it is fighting, and fighting hard, for more money for them, but does it see the way to solving the more fundamental difficulties once the economic pressure is relieved? If answers can be found to certain basic questions we may be able to build up a picture of the farming of the future. Since it is the NFU that is most closely associated with farmers themselves, and since it is in possession of all the information, such as it is, it is appropriate that this letter, and these questions, be directed to the Union.

Effluents

It was realized some years ago that if animals could be kept indoors under more or less controlled environmental conditions, they would gain weight faster and be more productive. If, at the same time the grassland they used to graze were to be ploughed up and sown to more nutritious feed productivity would increase again. Thus so-called "factory farming" became profitable, in spite of the heavy capital investment it involved. However, problems have arisen over the disposal of the effluent from intensive units which have little or no land to which can be returned the muck that was once used as a manure.

The amounts of effluent involved can be large. A cow produces something like nine times as much waste as a human being and a large intensive unit can dis-

pose of as much sewage as a small town. Local sewerage systems are unable to cope with the volume without re-equipping and river authorities are demanding that effluent be treated to a minimum standard before discharge into rivers. In 1968 an NFU official estimated that a farmer with a 1,000 pig unit might have to pay £15,000 for the plant necessary to treat his farm effluent, to say nothing of the subsequent operating costs. Where is he to find this sum, and if he cannot, what is the alternative? The most sensible solution is to return the muck to the land which grew the feed, but so far it has proved economically impossible to transport such bulky materials over long distances.

What solution does the NFU propose?

Drugs

The Swann Committee, which examined the use of antibiotics in livestock husbandry, concluded that the emergence of strains of disease organisms that are resistant to antibiotics constitutes a threat to the health of animals and humans. The Swann Report recommends strict control on the use of drugs for all but therapeutic purposes. If these recommendations are implemented farmers will no longer be permitted to use drugs prophylactically, to prevent disease before it occurs, or as growth stimulants in feed. Yet when animals are housed in such close proximity to one another the risk of epidemics is always present and once there is an outbreak it may be too late for the farmer's principal asset to be saved. What shall he do? If, on the other hand, he continues to use drugs as they are used at present there will be a steady decline in their effectiveness as bacteria acquire resistance and we may expect epidemics of enteric diseases among humans as well.

What is the view of the NFU on the use of antibiotics and the future of intensive livestock husbandry?

NPK dogma

Whatever is removed from the land in cropping must be returned to it. For years agricultural students have been taught that the whole of a plant's nutrient requirement can be supplied in a synthetic form and that the soil is necessary only as a physical base to anchor the crop. This view of plant nutrition has become something of a dogma. It is false. We know now that it represents a

gross over-simplification of a complex process. In 1967 Dr G. W. Cooke, FRS, a world authority, wrote: "Boundaries between sciences must be crossed by individual workers; if they do, they will understand better the nature of soil fertility which, itself, is an outcome of the effects of many kinds of living organisms, and chemical and physical processes, acting on the inert parent material from which soil is made."

Are students still being taught the NPK dogma and, if so, what steps is the NFU taking to bring agricultural education up to date?

Nitrates

A. Harry Walters, writing in the July, 1970, issue of the *Journal of the Soil Association*, quotes 189 references from the world's scientific journals, the oldest dating from 1928, that describe the harmful effects on crops, on soil and on animal and human health of the over-use of nitrogenous fertilisers. Nevertheless, farmers are still urged to buy more and more fertiliser.

What steps does the NFU advise to remedy this situation?

Soil structure

It was partly as a result of the Union's own investigation that early in 1970 the Minister of Agriculture ordered an official enquiry into soil structure and soil fertility: the two terms are almost synonymous. It appears that modern farming has brought about a decline in the organic content of our soils and that in some places this is now dangerously low.

What solution does the NFU propose?

Cover

Hedgerows are being removed from farm land at the rate of 5,000 miles a year. In European Conservation Year what proposals did the NFU put forward to reverse this trend and to save these areas of habitat that in some parts of the country are vital to the survival of much of our wild flora and fauna? At the same time, does the Union envisage a return to a more mixed farming system because of the problems facing the intensive indoor units? If this should happen will we not need more hedges to provide shelter?

Pests, weeds, disease

Nearly six million acres of Britain is devoted to the growing of barley, most

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of it for the intensive livestock lots. Never in our history has such a large proportion of our total acreage been given over to one crop. It is a basic principle of ecology that the continuous cultivation of one plant species over a wide area will lead to a progressive build-up of pests, weeds and disease organisms as the ecosystem attempts to restore a natural equilibrium. Attempts to control the situation by chemical means have been only partly successful and this success is diminishing as pest populations develop immunity to pesticides. Again, this is part of a natural process. It was to be expected and it has been well documented, particularly with reference to disease control programmes in the tropics. There are now some 250 species of farm insect pest that are immune to pesticides.

What control would the NFU substitute should chemicals have to be abandoned?

Petroleum

British agriculture is the most highly mechanised in the world. The proportion of population employed in agriculture is only three per cent, the world's lowest, and there are almost as many tractors as there are men. Geologists forecast the final exhaustion of the world's known petroleum reserves within the next thirty to forty years at current rates of consumption.

Has the NFU any alternative fuel to suggest?

Farmers are also dependent on other petrochemicals in the form of fertilisers and pesticides.

What alternatives does the Union suggest?

There are still farmers who believe one of the aims of farming is to leave the land more fertile than it was when they came to it, but most discussions of the future of farming nowadays assume the large increases in yields that have been achieved since the early 1950s will grow larger yet, that the industry will expand forever. Clearly, this is unrealistic.

There are children alive today who will inherit our farms in the 1990s. What will be their inheritance?

Michael Allaby

Tall storeys for children

A new human sub-species has increased rapidly over the last two decades—the flat dweller—an animal many urban planners are convinced is capable of adaptation to a life suspended in a reinforced concrete and steel tower, sometimes taller than 30 storeys.

This period has also seen the emergence of a new social disease, termed by many as “flat neurosis”. Latest confirmation that this condition is widespread has come from the National Society for the Prevention of Cruelty to Children, which in a startling report *Children in flats: A Family Study* concludes that, “There are very positive indications of an effect on the child in his early years, and there is a strong possibility of resultant behavioural difficulty in many instances.”

This warning is the outcome of an intensive survey of 280 families living in London, Harlow New Town, Bournemouth, Portsmouth, Southampton, the West Country and the Midlands. A comprehensive sample survey of local authorities was employed to strengthen the findings. Some 85 per cent of those interviewed would prefer to live in a house.

Long term suffering caused by an initial lack of adequate play facilities for children, especially in the pre-school category, is recognised as the fundamental disadvantage of family life in flats. “The child who is denied adequate opportunities for play with others is likely to be at a disadvantage in later life, because this lack stultifies his power to express himself and therefore to communicate with others”, declares Mr Arthur Morton, Director NSPCC, in the report's foreword. “He tends in consequence to become locked up within himself and to develop into the kind of person who cannot form adequate human relationships. In high flats it is rare to find that facilities exist to enable children to play together. This is a serious lack from which evil consequences may follow.” Restrictions, such as sub-standard or non-existent provision for play, can warp a child's entire personality, changing his complete outlook on life.

In 1952, the Brooke Committee, (*Living in Flats*), urged: “The provision of one or more playgrounds must be a first call on the available space around flats.” Yet the NSPCC report reveals that this call went largely unheeded and

that some developments still have no play areas, and the provision of the majority is “lamentably mediocre”. Indoor play space is even more scarce, although a few experiments are being carried out by local authorities in which part of a floor in a high-rise block has been converted into a nursery.

A vital key to the alleviation of the problem is the Urban Programme, the first two phases of which were launched by the Home Office in January 1969. This provides funds in the shape of grants to “areas of acute social need” and is part of a major £20-25 million programme to be spread over a four year period.

During the first two phases, some £8 million was awarded to authorities throughout the UK. After the third and final phase of the programme—due to end in 1972—a further four-year plan is to be implemented, providing an additional £40 million. The scheme operates on the basis of local authorities telling the Home Office what is required, and if the schemes are approved, 75 per cent of the cost is borne by grants. Unfortunately in the second phase 100 local authorities gave details of social and community projects demanding £10.5 million. The Home Office responded by awarding a total of £4.5 million.

Even so, the first two phases yielded 416 nursery classes (10,000 places) and also 64 day nursery schemes (2,000 places), and some £155,000 was allotted for under-fives playgroup projects in 34 towns and cities. One recipient of grants under the second phase of the programme was Southwark Borough Council. This authority is acting as something of a pioneer in the playgroup field. Of the total of £114,000 received for social projects, £30,000 is to be spent on the setting up of 12 supervised playgroups. Another eight such groups are planned for the future. This could become something of a blueprint for the nation.

Supervisory staff are the critical factor, as the NSPCC report states, “Playgrounds were not generally viewed with favour except for older children. They were thought to be impossibly dangerous for younger children on their own”.

Perhaps the second greatest problem faced by the flat-dweller is that of internal noise. It is unfortunate, to say the least, that this type of noise, intermittent and irregular, is the most irritating variety. This can be caused by lifts, stairways, machinery, pumping appar-

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atus and plumbing, together with sounds originating from what most people in houses would regard as everyday living. Again children pay a heavy price, for on many developments the playground consists of a corridor or stairway—and play in these circumstances is necessarily heavily restricted. This type of situation becomes even more difficult when a tower block contains a large proportion of elderly or childless couples, constantly disturbed by the inevitable noise.

The factors of isolation, loneliness and remoteness cannot be underestimated, and the report comments: "To look out of a twentieth-storey window at a miniature world peopled by mid-gets is to look on a planet of which one has no natural experience." As for the small child, "his boredom is unrelieved by contact with other children—so necessary in the development of social relationships and skills".

These themes are interwoven with factors such as space considerations and also methods of ingress and egress. Of the three types—gallery (balcony) access, corridor access and landing access—each has its own advantages and disadvantages.

For example, doors spaced along a balcony make for social contact but allow little privacy. A corridor with doors set along its walls may be regarded as institution-like, but allows good spacing and privacy. Upper floors of tower blocks are frequently considered healthy places, but medical research is calling for a re-evaluation. It has been said that the morbidity of families in flats is over 50 per cent greater than those living in houses. The greatest difference was seen in the incidence of respiratory infections in young women and children, and also of psychoneurotic infections in women generally: "The reasons for the difference in respiratory infections were felt to be the relatively small living space available in a flat compared to that in a house, and the confinement of the family within the flat. This confinement, and the resulting social isolations, were thought to be the reasons for the psychoneurosis in women."

But what of the local authorities themselves? The NSPCC were assured that,

where possible, only childless couples were allotted high accommodation. The NSPCC remark, "it transpired that babies have an inconvenient habit of being born in flats, an event that local authorities do not really allow for".

It is shown in the report that many people in high-rise blocks feel trapped. A typical situation might be a young childless couple entering a one-bedroom flat. Everything is fine until the first baby is born. How long do they have to wait for a transfer? The report found that "Sympathetic consideration could take up to two years". The GLC are less conservative, and say that there is no reason why the infant should not sleep in the parents' bedroom. This could mean being tied to the flat until the child is perhaps three or four years old.

A transfer depends on two factors—which cases are considered urgent, and how "choosy" the tenant is. This means that if the couple are willing to accept accommodation of a type not in great demand, they will be transferred much sooner. Of course, the homes least in demand are flats, so basically the choice is one of "a flat now or a house at a later, unspecified date." So there is a good chance that the new environment could consist of a flat once again—identical except for an extra bedroom.

What of the future of high-rise development? When the current building programme of the GLC is completed over the next five to six years, no more tower blocks are to be constructed. Unfortunately this is not the outcome of any consideration of environmental factors—but simply that high-rise developments cannot be built within the current cost yardsticks. A flat in a tower block can easily cost over £1,000 more than other types of dwellings, according to the report. So if the yardsticks, which are constantly challenged, are favourably revised in the future, high-rise construction will begin again.

Liverpool virtually abandoned high-rise building in September, 1969. Family flats in such buildings were described by the Housing Committee Chairman as "the curse, the greatest mistake Liverpool ever made". In the long term, as the cities swell, it is difficult to see how this kind of development can be avoided in the future. This is all the more reason to solve the problems now, today. For as the report warns, "They are the concern of everyone whose fate it is to live in a town".

Anthony Redding

Cousteau on ocean pollution

Anyone who has sailed the globe for a lifetime and is trained as a scientific observer is likely to be worthy of more than passing attention on the imperceptible but vital subject of ocean pollution. One such person is the French under-sea explorer Commander Jacques-Yves Cousteau.

Last September, having just completed a 155,000 mile voyage aboard his scientific research vessel *Calypso*, Cousteau accepted an invitation to address the Council of Europe in Strasbourg on this topic. That he did so was not particularly remarkable but what he said was. Alarming he reported that in his opinion "the intensity of life (in all the seas of the world) has diminished by more than 30 per cent and by less than 50 per cent over the past 20 years."

This was the result, Cousteau noted, of not only surface observations, but also observations to a depth of at least 500 metres. They covered fixed fauna, vegetation, plankton, shellfish, both edible and non-edible fish, coral and other less obvious forms of marine life.

Specific examples of widespread marine mortality were presented to the meeting; the emphasis being upon dying coral colonies, an indication of the onset of industrial pollution of the host waters. The coral reefs in the Red Sea that once stretched from the Gulf of Suez down to the Straits of Bab El-Mander have died so that now living reefs only exist in a very limited area about the latitude of Port Sudan and slightly southwards. Other dying reefs were reported in the Mozambique Channel; at Tulear, south of Madagascar; off the Chagos Islands and in the Seychelles.

Commander Cousteau went on to tell the meeting that the marine destruction was not as new a phenomenon as the current spate of publicity would lead one to believe. Recalling earlier times when the warnings of both him and his team members were ignored, and even ridiculed ("The alarm we raised in 1959 caused a near scandal"), he happily observed that "Today people are forced to admit that we were right, and that we were right because at that time we were almost the only ones to open our eyes under water." The recent voyage of Thor Heyerdahl on his papyrus raft across the South Atlantic had drawn attention to the widespread nature of oceanic oil pollution—had Heyerdahl been able to regularly dive below the surface, Cousteau said, he would have

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noted that not only was the surface of the sea being degraded, but also the transparency of the water was being reduced. Cousteau went on to describe his findings after diving off Cape San Lucas, Lower California, a lonely area frequented by only a few American multimillionaires seeking solace with a fishing line. While exploring unique underwater geological structures at a depth of some 600 metres he found that even in this deserted region of under-populated Mexico there were sea-bed accumulations of industrial rubbish; deposited from craft passing overhead and by currents which had probably swept the wastes down from San Diego and other US coastal cities.

The Commander then addressed himself to the task of putting the oceans in their true perspective. "The conviction shared by the public and the authorities that the World ocean is immense is deceptive." He admitted that on the human scale the volume of the oceans was colossal at some 1.3 thousand million cubic kilometres, and an average depth of 4 kilometres. But on the world scale it is minute (the volume of the Earth is almost 700 times as great) and we have reached that point when it can no longer be acceptable to consider the world ocean as an "inexhaustible source of supplies, or... as the world's dustbin."

Cousteau continued that "The dimensions of the ocean have been reduced by the dimensions of industry and we are now obliged to take into account the fact that the ocean's self-purifying power is already greatly overtaxed."

One of the factors in recent times that had clearly impressed itself upon the speaker and many other people, as he phrased it, was the "anatomy of our planet". He recalled being present in Paris at the official government reception for the *Apollo 11* astronauts and hearing Armstrong, in answer to a question about what had impressed him most on his epic voyage, describe how beautiful the Earth looks from the lonely confines of the Moon. In Cousteau's words: "The Earth looked beautiful—he has told us and we can see it from the photographs—because of the water which is to be found on Earth and hardly anywhere else in the Solar System. Of this

water, the water... This precious water, this rare water which forms oceans, also forms life—thus the identity of water and life is one of the essential truths by which our entire analytical study of pollution must be guided."

Developing his main theme the Commander went on: "Another anatomical consideration is the unity of pollution. We now know that water and life have identical cycles, we know that water is rare in the Universe and even rare on Earth; we have the good luck to have some of it. We must now get into our heads this truth: all pollution is identical. At present arbitrary divisions are being made between air, fresh-water and sea-water pollution, between the various pollutions of the Earth. The arbitrary divisions only spread confusion. There is only one pollution, because all toxic products which we are now using finally end in the ocean. All without exception! Exhaust from our cars, from our jets, the DDT used by the housewife to kill a mosquito in her flat, sooner or later end up in the ocean. This is one of the things which we must realise. We have one problem to deal with, the only one, that is the pollution of the waters, of waters in general."

But was pollution the only cause of the high degree of marine mortality stated by Cousteau at the beginning of his address? No, in addition there is over-fishing. Currently man is living under a delusion that year by year catch tonnages will increase in just the same way as they have done year by year in the past. The Commander rejected such thoughts and firmly warned the Council of Europe that: "In a very few years' time we are going to have a most unpleasant awakening. The tonnage only increases because of improved fishing methods and fishing tackle. The yield of each individual type of fishing is diminishing rapidly and it is now necessary to track down fish where there has hitherto been no fishing; this means it is growing increasingly rare... Shortly there will be none left. Thus over-fishing joins with pollution in destroying the oceans." Leaving the woes of over-fishing the speaker then briefly touched upon the perils of direct human intervention with the oceans, notably in the form of winning gravel from the seabed without first carrying out scale model tests to evaluate the likely effects.

Commander Cousteau had four proposals to put to the meeting: intensify research in the vast uncharted reaches

of global ecology; educate the public to call for the necessary measures to clean up the planet. Housewives must demand degradable detergents; returnable glass or paper milk containers, "soft" pesticides and less plastic packaging; persuade the producer—encourage manufacturers to yield to public opinion and persuade them to increase their outlay and consequently their product price without fear of competition; national and international legislation.

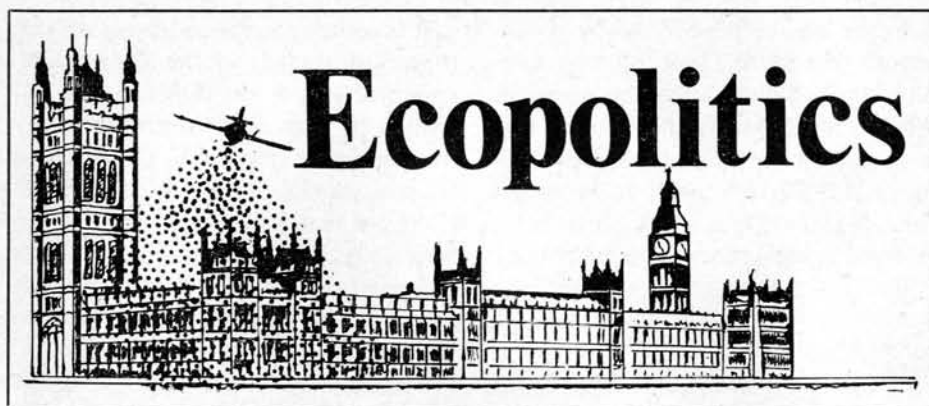
Clearly, Cousteau observed, the State which so readily assumes control of others and is at the same time one of the worst polluters cannot be any good at being its own watchdog. Instead Cousteau suggested that an independent body be established to take on the mammoth task. In the field of shipping for instance both Lloyds and Veritas—private companies—exercise immense power and control over the free world's shipping fleets. In his own words "A Veritas Board for International Pollution should be set up, this is a necessity—and this Board should have the power to publicise the results of analyses of public and private pollution. There is no hope of salvation unless we have independent means of control".

David Howard

Ecology Action Conservation Directory Additions:

L Henry Doubleday Research Association 20 Convent Lane, Bocking, Braintree, Essex. (Telephone: Braintree 1483). Provides useful, practical information for the amateur gardener who wishes to eschew artificial fertilizers and chemical sprays. Research in gardening without chemicals, especially poisonless pest control, with the help of members in many countries. *Information. Direct Action.*

LTGW Keep Britain Tidy Group (The National Campaign Against Litter) 76/78 Strand, London WC2. (Telephone 01-836 6463). An independent non-profit making public service registered as a Charity and approved by Government. *Protest. Information. Direct Action.*



Ecopolitics

Good news

In December of last year a select committee of the House of Commons threw out a plan to build a large reservoir at Swincombe in the middle of Dartmoor National Park.

Later that month the Government was defeated in the House of Lords during the third reading of the Water Resources Bill. Lord Kennet moved an amendment which would make it necessary for an application to build a reservoir in an area of outstanding natural beauty to be approved by Parliament. This was rejected by Lord Sandford, Undersecretary for the Environment, as being unduly restrictive of water authorities, but the amendment was carried by 100 votes to 50.

These are encouraging signs that there are men and women in both houses who are weary and fearful of the piecemeal itsybitsy approach to water supplies, which is so ruinous of landscape and so wasteful of land. Quite rightly they want to see applications for reservoirs and for water extractions of any sort considered in the light of a comprehensive water plan.

Later still in December the Government announced that the upper limit for lorry weights will be 32 tons and not the 38 tons hoped for by the hauliers and manufacturers. In the light of this we might remember Mr Walker's promises of action against vehicle pollution with more hope and a little less scepticism. At the end of November he told a conference of the London Boroughs Association that he was about to take action on vehicle pollution, that his measures would be tough and controversial, that the Government intended to be "strict and strong".

Mr Walker recognised that "professors will be produced to say that a particular kind of smoke is good for us", thus showing a nice awareness of the way powerful interests can brandish

their tame experts. But he argued: "On balance we must be over-cautious in this sphere. It will be possible for scientists to prove that a given level of pollution does no damage, but what scientists cannot say is that in 30 or 40 years there will not be damage to human beings, animals and plant life."

The Secretary of State should be congratulated for his responsibility and a far-sightedness unusual in a politician. But when will his promises be acted on? Where are the dates and targets we have been assured?

Mercurial venison?

I see in the Men and Matters column of the *Financial Times* that the Department of the Environment is known by its inmates as "Doe", after its initials, and that one of them commented, "if that does not stop the buck passing here, nothing will". If Mr Walker is to be believed (see above), one buck at least will pass no more. Others, however, are circling with giddy speed about the Ministry of Agriculture: the Swann Report, the report on soil structure and fertility, methyl-mercury, and DDT.

Methyl-mercury levels of between 0.1 and 0.8 parts per million were found in the 50 tins of tuna fish examined by the Government Chemist. Levels of between 0.1 and 0.5 ppm prompted the US Food and Drug Administration to destroy 1 million tins of the fish, but Mr James Prior, the Minister of Agriculture, following expert advice, has decided that similar action over here is unnecessary. The main justification of his opinion seems to be that the British eat only a tenth as much tuna as the Americans and are therefore less exposed to risk.

Mercury enters the environment in numerous ways: paper mills discharge it into rivers, hospital pathology laboratories send it down the drains (it is used in mercuric chloride solutions for clean-

ing tissue samples) and it is widely used in agriculture for fungicides. According to *Environment* (Vol. 12, No. 9) as much as 150 tons of mercury may be released into the atmosphere every year by US power stations. Samples of coal from south-eastern Ohio contained 0.4 to 0.5 ppm of mercury.

Once in the soil or in the sea mercury can be converted into its organic form—a liquid which boils at roughly the same temperature as water, which will evaporate, be easily dispersed, and come back down again in rain anywhere in the world. Not only does it freely circulate in the environment, it also speedily enters biological chains and can cross barriers like that of the placenta. Thus human embryos are at considerable risk. Methyl-mercury also causes irreversible damage to certain brain cells, principally those of the frontal lobe. It can remain in the body for many months and is of course cumulative.

It goes without saying that permitted levels are arbitrary. There is no threshold of safety for stable cumulative poisons like methyl-mercury, whose low-level long-term effects we cannot predict, but only fear. Sweden has fixed on 1 ppm, the US on 0.5 ppm. Given these levels, the US has destroyed a large quantity of fish, and Sweden has advised that fish should not be eaten more than once a week. In Britain mercury levels in the fish most commonly eaten are extremely low, but given our ignorance of the movements of mercury, and knowing that it is cumulative, it is surely better to act as the US has done?

Mr Walker feels that it is wiser to be over-cautious in the sphere of vehicle pollution. Why does Mr Prior think we need not be over methyl-mercury? Has he forgotten the adage, better safe than sorry?

Scientists at Florida State University have recently shown (*Science*, Vol. 170, p. 736) that mercury levels as low as 0.1 parts per billion (US) seriously inhibit photosynthesis in phytoplankton. It is obvious that even if the British public gets away with negligible numbers of deformed children and prematurely senile adults, the quantities of mercury must be limited—and quickly. Yet they are growing fast, and as the Green Revolution gets under way in the campaign to increase the number of people we shall be unable to feed in 30 years time, vastly greater amounts

will be required to protect the highly vulnerable high-yield wheats and rice from fungi. What is the point of temporarily staving off famine if we are poisoning the seas—and the protein they contain—in the process?

Mercuric fungicides should be heavily restricted, if not banned altogether. And industry and other users of mercury should be required to recover it from whatever processes they use it for, and not to send it down the drain. Technically it is not difficult. All it requires is early legislation. While we are about it we should also establish controls for cadmium, lead, nickel carbonyl, beryllium, and antimony. But that's another story.

Good gardeners use DDT

I imagine there must be quite a number of conscientious gardeners who hearing that DDT is rather bad for us and the environment we share, stopped using preparations known to contain it. It seems they have done quite the wrong thing. What they should have done is go on using the 26 products containing DDT—as recommended in a Ministry booklet, *Chemicals for the Gardener*, out-of-date on the Ministry's own admission but still selling briskly. This of course goes counter to a November 1969 recommendation of the Advisory Committee on Pesticides and Other Toxic Chemicals, and indeed the stuff has been banned since then.

However, the breathing space given to the manufacturers of these unnecessary poisons has now been extended to September 1971. Why? Because they haven't got rid of their stocks yet. Why? Perhaps because DDT is dangerous, and gardeners know it.

Come on gardeners, pull yourselves together. The only way to halt pollution is to pollute as hard as you can.

Supersonic second thoughts

In March Mr Corfield, the UK Minister of Aviation Supply, will meet M. Mondon, France's Transport Minister, to decide the future of Concorde.

Meanwhile in the US, Congress has voted the American SST only enough funds to last it till March, when battle will be joined again over the Senate's decision to cut it off without a penny. A Bill has also been introduced which would ban civilian supersonic flights over the US until it has been proved that they will have "no adverse effects whatever" on the world environment.

In the US the pro-SST lobby is convinced that an SST will operate commercially whether it be American or Anglo-French. Mr Boland (the man who is managing the SST allocations Bill) has said, "There is going to be supersonic flight, whether we like it or not". And Mr Halaby of Pan Am has stated: "The SST is coming. The sole question is whether we do it, or whether we let somebody else do it".

The fate of both SSTs depends on both economic acceptability and social/environmental acceptability. The manufacturers of Concorde seem confident that it will be profitable on a run like London to New York, provided that the fare is a one-class "premium" one, higher than present economy levels but lower than first-class. A journey time cut by a third to a half, they claim, should be sufficient inducement.

The social/environmental acceptability is much more doubtful. By now it should be obvious that the supersonic boom is a social menace, but the likely effects of SST operations on the upper atmosphere are more open to argument. One must suspect therefore, attempts by the US Government to suppress what information there is.

It is resisting in the courts an attempt to publish a study of the SSTs effects, commissioned by the White House, and written by a group of scientists led by the industrial physicist, Dr Richard Garwin, who has already testified before Congress that the runway noise of an SST would be as loud as 50 jumbo jets taking off together, but the least favourable evidence has been on its effects on the atmosphere.

The Administration claims these are not harmful, and the Justice Department argues that the President has a constitutional right to keep the study document to himself. While information is withheld, however, SSTs must remain suspect. The estimate of Concorde's research and development programme has been revised upwards to £825 million, of which the UK must bear £405 million. We have already spent £220 million. Why should so much be spent on a tiny minority who will pay a bit extra to get to New York in two-thirds the time it takes today—especially when the cost to the environment is likely to be immeasurably greater? The Government has yet to give us an intelligent answer.

Robert Allen

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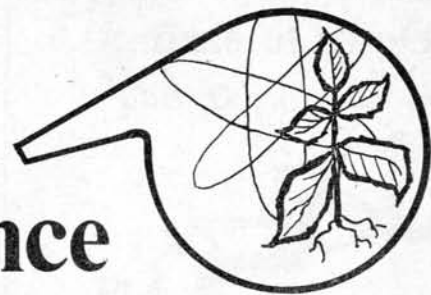
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Towards a unified science



Responding to the environment as a whole

One of the main features of the development of the nervous system has been its gradual centralization. The primitive nerve-net slowly gave rise to the central nervous system whose functioning then became more and more dependant on the brain. This process is known as encephalization.

What is the philosophy behind this change? The answer is that, in the face of environmental disorder, the organism, if it is to survive, has to behave more and more as a unit, i.e. the number of those cases in which the separate parts can function on their own is correspondingly reduced.

This implies that, whereas previously a great many environmental changes were only relevant locally, i.e. to the behaviour of the parts, they are now taken to be relevant to the behaviour of the organism as a whole. Let us take the case of the nervous system of the octopus. This strange animal has a large ganglion, or rudimentary brain, in each of its tentacles, as well as a smaller one in its head. Such an organization of the neurons is valid only in so far as the information derived by each "brain" can be considered of so specialized a nature as to be relevant only to the corresponding tentacle and of no consequence to the rest of the organism.

Behaviour, as we go up the ladder of life, is more and more determined by the interrelationship between the whole environment and the whole organism. Significant in this respect is the fact that the centralized brain uses the same classificatory system for all parts of the environment. Thus there is no division of the information within a model in accordance with the different detecting devices used (smell, sight, taste etc.). Also an organism can only classify things in terms of the classifications that have proved useful in the interpretation of the environment they have so far been submitted to. Thus the

Tahitians, when they first saw horses, classified them as "man-carrying pigs", since the pig was the only quadruped of which they had any experience. Similarly, whatever the environment to which a lion be subjected, it can only be classifiable in terms of the latter's behaviour pattern. This is true even if an organism is taken out of its natural habitat and put into an environment which bears no relationship to anything of which it has had previous experience. Thus, if a lion is put into a shoe-factory, the machines, the piles of shoes and all the other constituents of this new and strange environment can only be classified in a way that is relevant to the lion's behaviour pattern.

Thus not only our normal environment—that to which our evolution and upbringing are adaptations—but also any new, unforeseen environment is classified in terms of the variables of the same model. In other words, *a signal is not classified according to how it affects a single behavioural centre, but according to how it affects the brain as a whole.*

Cut and dried stimuli, such as an excellent meal presented to a hungry man, will clearly affect the behavioural centres determining eating so strongly that the effect of this stimulus on other centres such as those determining sexual, paternal, aggressive behaviour, may be almost negligible, but never entirely so. More complex stimuli, such as a violin concerto, will, on the other hand, affect a variety of centres and determine a more composite response.

Nevertheless, it is only by regarding the whole of our environment as classified in the same brain, whose role it is to determine the optimum behaviour pattern to our environment, that it is possible to understand human behaviour.

Several illustrations can be given. In the advertising business, it is current to talk of "the image" of anything one is trying to sell, whether it be toothpaste or the Democratic candidate in the

American presidential election. By "image" one in fact means its status as a stimulus for our various behaviour tendencies, i.e. it will tell us what "instincts" the product is appealing to, and thus what should be our method of selling it.

Thus, the success of a large number of designs for consumer products at first sight unconnected with sexual behaviour can only be explained in so far as they act as stimuli for sexual, among, of course many other types of reactions. Sports cars, cameras with a lot of stainless steel and large telescopic lenses, are obvious cases in point. If a design does not appeal to any of the basic classifications of human behaviour, it will usually be a commercial failure.

Similarly, behaviour towards political leaders can only be understood if the latter are interpretable as possible fathers, husbands, lovers, sons, grandsons, rivals, brothers, etc.

Mr. Adlai Stephenson expressed his hatred of the process involved:

"The idea that you can merchandise candidates for high office like breakfast cereal... is the ultimate indignity of the democratic process."

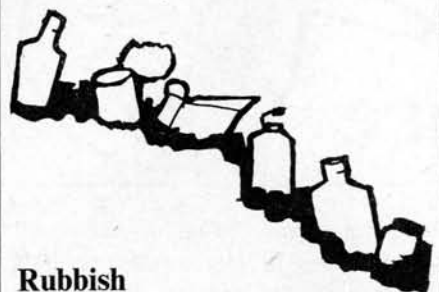
To conclude: it appears to be the case at all levels of complexity that as order develops, so the systemic model on which behaviour is based tends to represent more and more the environment as a whole. This implies that the environment ceases to be split up into different areas, behaviour towards each of which is entrusted to distinct specialized mechanisms.

There is every reason to suppose that this must be equally true of the development of a scientific model, whose division into specialized disciplines using distinct and unrelated classifications, must slowly be abandoned if scientific method is to be extended to the interpretation of behaviour at a high level of complexity.

Edward Goldsmith

Down to earth

by Lawrence D. Hills



Every day of our lives, every one of us, including babies, makes 5 lb of rubbish, averaged over the whole 56 million of us. It is only when our individual 35 lb a week piles up in the streets as it did in last year's municipal workers' strike that we can see ourselves as among the world's worst wasters.

When housemaids struggled up four flights of stairs with gleaming brass coal scuttles and kitchen ranges roared, our dustbin refuse was 80 per cent ashes and cinders. Today, as in America, our refuse is roughly 50 per cent by weight waste paper and far more by bulk, as anyone who saw London's pavements blocked with rubbish filled cartons will realise.

In 1966 the USA salvaged 10 million tons of waste paper, which is 20 per cent of their consumption. They have a highly efficient de-inking process that made it possible for three paper factories in 1969 to convert 365,000 tons of old newspapers into 320,000 tons of fresh newsprint at a cost of seven dollars a ton less than paper from new wood pulp. America's paper salvage saved felling 13 million acres of trees.

We save 27 per cent of a small consumption and Japan 46 per cent of still less, but we owe our lead on the US to the Boy Scouts who have an arrangement with a large wastepaper dealer to take the nation wide salvage gathering that earns a major part of their funds. Details are a secret between the Board of Trade and the waste paper industry, but Britain imports quantities of waste paper which is an economic scandal while Council after Council is giving up collecting salvage.

Colchester still keeps up the system of a trailer behind the refuse lorry for bundled newspapers and emptying salvage sacks put out by householders, and this kind of material can still earn £8-

£10 a ton delivered at the paper-mill. Those who are concerned with a cause or a charity could help it far more effectively by bringing car loads of newspapers and magazines (tied in 28 lb bundles) to store in a loaned garage or empty shop than by organising an entertainment with takings swallowed by expenses. First find a wastepaper dealer in the yellow pages of your telephone book, for one within five miles will send a lorry and pay £4-£5 a ton for a minimum two ton load.

The ideal answer for dirty paper, used envelopes, empty packets and torn cardboard would be composting to add extra heat and lasting humus to the kitchen wastes already composted with garden rubbish. Unfortunately there is no activator that breaks down paper to fertility for every garden, and no domestic equivalent to the modern pulveriser that now makes municipal composting far cheaper than incineration.

These machines cost about one tenth as much as a refuse destructor of the same capacity, have one sixth of the running costs, and instead of adding to air pollution, or demanding additional cost for smoke purification, they can give back the humus the land needs.

There are many makes but the Tolle-mache is the most popular because of its low cost and simplicity, and the fact that with 25 in operation all over Britain, it is easy for a Borough Engineer to see one working and talk over snags and advantages with the man who is running it rather than a salesman. They cost between £35,000 and £55,000 according to the building to house them, and process 10-15 tons of refuse an hour.

At Easthampstead in Berkshire they merely use the advantages of pulverisation for landfill over controlled tipping and make no attempt at composting. Three men, including a driver taking the pulverised refuse to fill an old gravel pit, handle the refuse from 80,000 people at the rate of 85-87 tons a day, costing 12/- a ton for the whole operation. They gain by reducing the bulk by two thirds so the tip lasts longer, by the banishing of flies and rats which will not live in pulverised refuse because it so swiftly becomes compost and by the lack of need for any covering soil. There is no fire risk even though the refuse heats to 160°F as it composts, because there are no "voids" or spaces to start the bacteria that heat up haystacks taking the tem-

perature up to burning point. The object here is to fill the site with first class solid soil in ten years and lay out playing fields, then sending the pulverised refuse to other worked out pits.

The Henry Doubleday Research Association has experimented with this type of material and finds that a foot thick layer will grow at least three 16 ton an acre potato crops without further manure or fertiliser. A Council engaged in this kind of filling area could well spread a first layer over part of the pit, crop for three years and then add another foot, for ten acres of potatoes earning about £2,000 a year are a convincing argument both for compost buying farmers and Borough Engineers convinced they can never sell it.

Though Horley, Surrey, began by filling a pit, they now make and sell compost both with and without added sludge. It pays to damp the refuse slightly both for better composting and to keep down the dust, but it is also possible to add sewage sludge straight from the air drying beds to improve the product both for sale and as a fill, and to solve the sludge disposal as well as the refuse problem. Another improvement is a magnetic pulley on the conveyor belt that will throw out tins, though large ones, and heavy metal such as cylinder blocks are hurled out by the pulveriser. The pulley costs £1,100 and a baler to crush 15 tons of tins a day, £6,000, but the price of baled tins fetched five miles by a scrap dealer is only £3 a ton so it can be uneconomic.

At Horley the pulverised refuse is spread in long heaps to heat, turned twice with the tractor and foreloader that makes them, and left 30 days to mature after cooling. It is screened to remove plastics and tins which are dumped in the original pit (the glass is ground fine as sugar) and then either loaded for sale in bulk or bagged. The analysis averages 25.46 per cent organic matter, 0.80 per cent nitrogen, 0.28 per cent phosphorus and 0.36 per cent potash, while adding sludge increases the organic matter, nitrogen and phosphorus. Sludge contains only a trace of potash so is always unbalanced, but this compost holds rather more than farmyard manure, for it now has all that there was in the wood that made the paper, and is now ready to go back on the land where it belongs.

Ecotechnics

by Arthur J. Puffett

Methods of dust collection

To the layman, the terms used to define a method of dust collection in an industrial system leave much to the imagination. I will therefore list the different methods employed, giving a simple explanation which I hope will assist those who, like myself, detest being offered a morass of technical jargon without explanation.

The cost of a dust collector is usually directly proportional to the size of dust particle being retained: it is far easier to retrieve grit than particles which may be invisible to the naked eye.

Settling chambers are used to separate grit and coarse particles by passing the dust-laden airstream into a large chamber. The speed of the airstream is slowed down, allowing the heavy particles to fall to the bottom. Settling chambers are more commonly found in association with blast furnaces and sinter plants, where high volumes of air and temperature occur.

Inertial and centrifugal separators both impart forces on an airstream to separate the dust. Inertial separators deflect the stream through baffles or louvres, the momentum of the dust particles carrying them to a collection point. Centrifugal separators, as the name implies, impart a spinning action to the airstream, centrifugal forces hurling the dust to the sides of the collector where they are recovered.

Gas scrubbers, often referred to as wet collectors, use water to assist in the separation of particles from an airstream. The airborne particles are bombarded by jets of water, sprayed into the airstream. The particles are held by the droplets and fall to a sedimentation tank for collection.

Electrostatic precipitators work by passing an airstream between metal plates which carry a high voltage, the dust particles gaining a static electrical charge. Earthed plates attract the dust, and periodically they are cleaned by vibration or by water, the particles being

collected at the base.

Fabric filters, held across a flow of air, pick up virtually all the dust in the stream, operating in a similar way to that of the modern vacuum cleaner. They are extremely efficient in operation, but cannot, for obvious reasons, be used where the temperature of the gases is very high.

Filters are cleaned at regular intervals, the flow of air being stopped during the process.

The final type of dust collector, the "absolute" filter, uses cellulose or asbestos papers as the collector, and is used where it is vital to retain all traces of dust. This method is employed in the final cleaning of gases containing radioactive wastes or other toxic impurities.

The Aeropur—burning rubber without smoke

Many readers will have seen that excellent television programme which highlighted the problems faced by the city of Houston in an attempt to find a satisfactory method of disposal for one of the affluent (or effluent) society's commercial headaches—tyres.

However, a British company seems to have solved this particular hazard together with those associated with other noxious wastes, including plastics and hospital wastes.

Redman, Heenan Froude Limited, the Worcester engineering company, have introduced the new anti-pollution device—the Aeropur Electrostatic Filter. Designed to suppress the emission of particulate matter into the atmosphere, Aeropur, when coupled to industrial incinerators, boilers, dust extractors and other similar equipment, eliminates smoke and considerably reduces the release of gases.

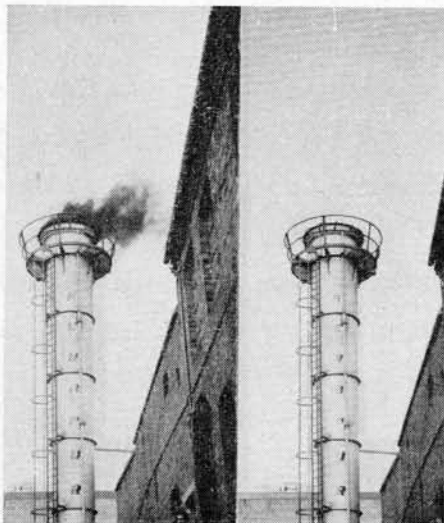
Aeropur has proved 99.4% effective in eliminating smoke (dust), down to sub-micron size, during the combustion of rubber tyres, and the sulphur dioxide content is reduced to 70%. Other volatile gases and chemicals which have shown considerable reductions include sulphur trioxide, chlorine and hydrochloric acid.

The Aeropur filter is designed to handle 8,000 cu. metres of smoke/gases per hour at a maximum temperature of 400°C. Running costs are extremely low—comparable to a 0.5 kW electric fire—and as the unit is itself an exhaust duct, the need for a chimney is eliminated. Aeropur uses three dust removal techniques in one device: centrifugal separation, gas scrubbing and electrostatic precipitation.

Dust laden gases from the incinerator enter the Aeropur's tower base through an involute entry port, where they are directed, by fixed helix, to a spiral path ascension. A central mast mounted upon an insulator carries banks of electrodes having multipoints to permit the corona discharge to ionise the dust particles.

The whole central mast assembly is at high negative potential (150 kV D.C. at 0.6 mA) while the tower acts as the earth return; therefore the resultant charged particles are attracted to the side plates where water irrigation washes them to the tower base, and thence to a settling tank, where the agglomerate can then be removed. This continuous particle removal obviates re-entrainment. The water can be re-circulated thus avoiding wastage and consequent high water costs.

Aeropur is designed to handle gases up to 400° (750°F) but should the crude gas have a higher temperature, the company can supply a water cooling system to reduce the gas temperature by spray injection. This additional water vapour in the gas allows agglomeration of the dust particle content, increases chemical conductivity and assists chemical reaction between aggressive gas constituents, resulting in a higher overall efficiency.



Classified Adverts

PAUL THE CARPENTER. Please will Paul The Carpenter give us his address or telephone number as we would like to contact him.

LEOPOLD KOHR's thesis on the heresy of size, *The Breakdown of Great Britain*, 2s 6d post free from the South Place Ethical Society, Conway Hall, Red Lion Square, London WC1.

ESSEX. Readers of *Ecologist* in Essex please write or telephone W. H. Cazaly, 1a Calne Ave., Clayhall, Ilford, Essex, Tel. 01-550 8060, view to forming local group of people of similar interests.

GROWTH—DISILLUSIONED Chartered Accountant seeks interesting and useful position in conservation etc. sphere. Box 110, *The Ecologist*.

CAMBRIDGE MATHEMATICIAN (third year) seeks interesting job starting next summer. Box 111, *The Ecologist*.

EXPERIENCED SECRETARY requires part-time work in Ecology, Conservation Field. Box 112, *The Ecologist*.

ECONOMICS GRADUATE, 22, seeks employment connected with environmental management; willing to travel anywhere. Contact Rob Goodale, 9 St. Phillips Road, Norwich 87G.

FED UP with civilisation? South American anthropological expedition requires male paying participants to leave almost immediately for five or six months. Ring 01-722 0932.

DARTMOOR FARMHOUSE, thatched, secluded, sleeps 6, mod. con., all electric, fabulous views, close open moor, available for holiday letting March onwards: White, 33 Ridge Hill, Dartmouth.

In the next issue of The Ecologist

Can the Seas Survive? by J. David George. An examination of the long-term effects of pollution on marine life.

Need Venice Disappear? by Sir Ashley Clarke. The Vice-Chairman of the "Venice in Peril" Fund describes how and why floods threaten Venice.

The Optimum Population for Georgia by Eugene P. Odum. The distinguished ecologist takes Georgia as a microcosm of the United States, and shows that it will shortly be overpopulated.

The Ancient and Ornamental Woods of the New Forest by G. W. Dimbleby. Why the Forestry Commission should let them be.

This month's contributors

W. M. S. Russell is Lecturer in Social Biology at the Department of Social Biology, University of Reading. With his wife, Claire Russell, he has published numerous papers on human and animal behaviour, and two books—*Human Behaviour: A New Approach*, and *Violence, Monkeys and Man*.

Roy Bridger is a crofter living in Rosshire. He is well known for his many articles on ecological topics.

G. N. Syer is Chairman of the London Branch of the Conservation Society. He is currently lecturing in English at Isleworth Polytechnic.

ACT NOW

Sydney Chapman's

Urban and Rural Environment Bill depends on you.

This private Member's Bill, which is designed to protect trees, hedgerows and old buildings, is due for its second reading on Friday, 5th February. Write to your M.P. today asking him to support it, and to the Secretary of State for the Environment indicating your concern that this Bill be passed.

At the moment despite existing legislation it is relatively easy to lop or destroy fine trees, to uproot hedges, and to demolish old buildings. The Urban and Rural Environment Bill aims to close the gaps. Your letter will make all the difference, provided you send it today — so please write now.

student action

More campus information

At the University of Durham last year, staff and students came together to organise a teach-in on the subject of "Population, Starvation, and their Political Impact", and at that University there has been established an active ecology action group named CATER (Comprehensive Approach to Earth's Resources) which devotes its attentions to feasibility studies of solutions proposed to cope with growing environmental pressure.

At the University College of Wales, Aberystwyth, the United Nations Student Association provides the vehicle for involvement in environmental conservation and improvement. In January 1969 a series of study groups were set up, each consisting of between five and twenty students, to examine aspects of local pollution, the motor car and society, legal aspects of pollution control, wildlife and conservation, the economics of pollution control, pesticides, domestic and industrial waste, and the public propagandising of the problems to be faced. In addition to this more theoretical and academic attack, many students, as in other colleges, are involved in practical work through such organisations as the Royal Society for the Protection of Birds, and these students have come together to form a "watchdog" committee to protect the local environment from thoughtless despoliation.

That care for the environment is not confined to the preservation of rural beauty is well illustrated by the Social Action Group at Bradford University. In the summer of 1969 this group constructed an adventure playground for local children on a formerly derelict urban site. Last year they extended the idea by converting a disused goods yard into a fairground-cum-open-air theatre in which they staged a Wakes Festival. To achieve such results, the group has kept in close touch with the local coun-

cil, which (in common with most other councils in the UK) welcome such constructive application of the students' ideals.

Increasing attention is also being paid to studies in Ecology and Conservation in the Universities. Currently there are four universities in Britain which offer M.Sc. courses in this field. At Aberdeen and Bangor the course is regarded as a "broadening year" particularly designed for students going into teaching. At Durham the emphasis is placed on population and production studies and the aim is to provide a useful training especially for overseas students who will later return to their own countries. The course at University College, London is geared to graduates who will take up work in such fields as wild life conservation, rural land use planning and the management of reserves and national parks.

At the University of Wales Institute of Science and Technology (UWIST),

Prof. R. W. Edwards has developed a scheme of staff-student involvement in useful and applicable environmental research. The Taff Project Group is financed by the Senates of the University College of Wales and UWIST, Glamorgan County Council, and the River Authority. It employs about ten students per year during the long vacation (at about £12 a week) to assist staff who are engaged in monitoring pollution in the Taff and assessing conservation requirements, as well as to construct nature trails in the locality. The Taff Project is of great value to undergraduates and research fellows alike, and involves a cross-section of the academic community in work of an extremely important nature. UWIST has shown that when researchers apply for grants to the NERC, the Council is prepared to include in the grant due provision for the payment of undergraduate assistants.

Graham Searle

Ecologists of the world, Unite!

That, after all, is what ecology is about. If more of our social, economic, political and technological problems were seen in their wider context—ecologically in fact—there might be fewer disasters like Aberfan or the Torrey Canyon. These are the ones that make the headlines, but there are others, such as the steady rise in the incidence of degenerative diseases whose cause is most likely environmental.

We are an international voluntary association dedicated to the study of, and dissemination of information about, human ecology. We run an experimental farm, because man's environment begins with the soil. In collaboration with universities and other research bodies we aim to discover the long-term effects of differing systems of husbandry on the soil, on food, on wild life and on man himself. Our publications carry informed articles on farming, forestry, food, nutrition, land use and conservation, as well as book reviews and news.

Drop a line to our Secretary and he will gladly send you, free and with no obligation to join, details of our Association and specimens of our publications.

The Soil Association, Walnut Tree Manor, Haughley, Stowmarket, Suffolk

Feedback

Image-seekers

During European Conservation Year enough pressure was put on industrial companies to reduce river pollution for some to employ public relations consultants to give them a clean image as "conservationists".

According to Mr Charles Wade, director of the Anglers' Cooperative Association, which exists to fight pollution in the interests of angling clubs, "Some firms are trying to give the impression that much more is being done about pollution than is actually the case."

The Guardian

The pill—new warning

Birth control pills may induce serious defects in newborn children over a period of time says Charles Scott, head of the genetics department, University of Utah.

Tentatively reporting a research on 90 women taking the pill during the past 2½ years, Scott said that half of them had damaged chromosomes. In some cases, chromosome damage reached as high as 24 per cent—well above the average 2-6 per cent breakage found among women not on the pill.

"If this chromosome damage continues, and we think it will, we could have birth defects as bad as those caused by thalidomide," Scott said.

Rodale's Health Bulletin

Noise on the MOT

A call for motor vehicles to be checked for noise as part of the annual MOT test was made to Peter Walker, Minister for the Environment, recently on behalf of the Noise Abatement Society.

Mr John Connell, the society's chairman, in a letter to Mr Walker said "We were very pleased to learn that you propose to introduce "tough and controversial" measures against noise from road vehicles.

"We sincerely hope that the measures will include a maximum permitted noise level of 80 decibels A at 12 ft, which is the furthest

distance to which a pedestrian can normally retreat, and a practical method of enforcement."

"Under existing regulations," Mr Connell said, "a vehicle could successfully pass the test (92 decibels A at 25 ft on the open road) and quite legally assault the public in town with a noise in excess of 100 decibels A. Measurement is also utterly impractical and expensive in money and manpower."

Mr Connell explained a more practical method of enforcement which is that police officers and traffic wardens should carry a small "noise torch" which showed when a prescribed noise level was exceeded. The registration number would be taken of the offending vehicle and the owner required to produce a certificate proving that his vehicle complied with the regulations. The certificate would be obtained from a garage testing station.

Daily Telegraph

Detergents and oil

Detergents should not normally be used to clean up oil on beaches, it was stated at a conference on oil pollution at London Zoo.

Although the new group of emulsifiers are much less poisonous than the old type used in the *Torrey Canyon* disaster, beach cleansing by emulsifiers must still be regarded as deliberately tipping poisons into the sea.

This was the finding of an investigation by Geoffrey Crapp and Jennifer Baker of the Field Studies Council oil pollution research unit. The research was supported by grants totalling £9,500 from the Institute of Petroleum and the World Wildlife Fund. Crapp and Baker said that oil should be removed mechanically whenever possible.

The Times

The seeds of famine

The trend towards worldwide farming of a few high-yield "miracle grains" may actually be sowing the seeds of famine in developing countries, according to US agricultural consultant

William C. Paddock. Should the supposedly disease-resistant crops be planted to the exclusion of other varieties, and should they then be attacked by an unforeseen disease, as was the corn crop in the United States on a small scale last year, then the result could be widespread starvation and poverty.

While the United States, with an available variety of grains, could adjust to such a situation and keep its people fed, a country like India would not have the same chance. Instead people would starve to death, as they did in Ireland after the potato famine in the 19th century, said Paddock.

A report from the Rockefeller Foundation said, "All across Southern Asia (not just India) there has been a rush toward one dominant family of wheats prized for its yielding ability . . . all of this wheat carries the same kind of rust resistance which means that if a new race of rust to which it would be especially susceptible were suddenly to appear, much of the wheat crop of that whole vast stretch of the world could be devastated almost overnight."

Rodale's Health Bulletin

Giants killed

Amenity societies were pleased with the Government's decision not to give the go-ahead to the giant 44-ton lorry.

Mr Arthur Percival of the Civic Trust said "What we have to do now is to continue efforts to get more roads restricted for use by heavy lorries. Acceptable noise levels for lorries in open spaces are far from acceptable in narrow city centre streets."

The Guardian

Canned quick-silver

Mercury at levels similar to those found in tinned tuna in the US, was found in the batch of tuna samples analysed by the Laboratory of the Government Chemist.

The laboratory examined as a matter of urgency, a "large sample of tuna with a view to determining the concentration of methyl mercury." It is clear that the Ministry of Health is worried and that something disturbing has already been found.

Only tuna has so far been examined but it is likely that similar findings will be made in salmon. At these levels, however, the tinned fish is not a direct hazard to health. On the other hand,

the levels are alarmingly high; methyl mercury remains in the body for many months and can accumulate.

Britain has no regulations governing the "acceptable limit" for mercury in food.
The Guardian

8 All that glitters . . .

"The romantic Golden Horn which has been the inspiration of poets and men of literature for centuries past, is no longer blue; nor can the shadows of the minarets on the hills be reflected in its water. The Sea of Marmara and lakes situated in this region are also being polluted by residues left by industrial plants, which constitute a very serious public health problem." This was the view of Dr Nevzad Yalcintas in his recent paper "Urbanisation and its impact on man's environment in Turkey." Coastlines, rivers and lake shores conserved as recreational and tourist sites were rapidly being polluted, said Dr Yalcintas, presenting his researches at a UN symposium, with the result that marine life would soon become extinct.

Chicago Tribune

9 New Forest

Test borings for oil under the New Forest in Hampshire have been made by British Petroleum in the past few weeks. The work has caused controversy in a conservation-minded area already threatened with a civil airport and critical of the Forestry Commission for cutting down too many oaks and beeches. Conservationists are concerned that the plans were not made public and that the forest guardians allowed the drilling to take place.

Daily Telegraph

10 Ecology technicians

Twenty students from South High School in Cleveland, Ohio, are helping the city's schools make history. They are enrolled in a course designed to train technicians to operate air and water pollution control devices. Several college-level courses in this field are being taught now but Cleveland's course is believed to be the first in the country for high-school students. "In years to come," said the director of the school system's technical-vocational education division, "there will be a large number of jobs open to high-school graduates trained to work under the supervision of engineers in the air

and water pollution control field. We're just making sure qualified people are ready to fill these jobs."

The Plain Dealer, Cleveland

11 Take ads

Standard Oil of California was accused recently by the Federal Trade Commission of falsely claiming that its F-310 additive in its Chevron gasoline significantly reduces air pollution when used in cars.

The commission said the company used a "specially formulated gasoline which . . . caused black exhaust" to appear in a clear plastic balloon in a TV advertisement to represent fuel that does not contain F-310.

A second balloon, which remains clear in the advertisement, was filled with exhaust from the same automobile after several tankfuls of Chevron with F-310 the company claims. The FTC said F-310 is a common additive that cleans engine parts but does not significantly reduce emissions of carbon monoxide or hydrocarbon pollutants.

The Evening Bulletin Philadelphia

12 Wishes kill fishes

Pollution has struck the fishpond in the lobby of the Texas Parks and Wildlife Department's headquarters building in Austin, USA.

Department officials say that hundreds of copper pennies—tossed into the pond by wishful visitors—are poisoning the water.

The pond stretches along the front of a dramatic diorama of Texas wildlife.

Ted Lowman, a department official, said the pennies kill every type of fish put in the pond, including black bass, carp, hybrid sunfish and catfish.

The Houston Post

13 Meeting the cost

The private costs associated with the production and consumption of goods do not reflect the social costs and it is their difference that gives rise to the pollution problem, according to Lee Hoskins of the US Federal Reserve Bank. The most effective way to deal with the pollution problems might be to price it out of existence, he claims, using the very same price system which so effectively directs the use of resources in our market economy to work for environ-

mental products such as clean air and water. One way would be to reduce some of the common ownership rights in natural resources such as air, waterways, roads and public lands. In place of common ownership, rights to use resources would be created and sold. In effect, each polluter—the factory owner, the automobile driver—would be charged for the waste products he emits into the atmosphere or water. The price charged would reflect the damage done by pollution. In theory, each polluter would be free to discharge any amount of waste, so long as he paid the price. In reality, his own self-interest would prompt him to reduce his pollution output as much as possible.

Philadelphia Inquirer

14 Engineering leadership

A top-ranking Westinghouse Electric Corp official has urged the nation's public works companies to "stick their necks out" to find solutions to the growing environmental problems. Paul Gaddis called for the companies to exert "engineering leadership" in the fight against pollution. "We need to build an atmosphere that permits new technical approaches in each of our cities to these critical environmental needs. He recommended new technological advances in the fields of water quality control, sewage disposal and drainage to combat the urban pollution crisis.

Dallas Times Herald

15 Dusty answer

Hormone dust used in the eradication of thistles has again caused thousands of dollars damage in Waikato, New Zealand. A 60-square-mile area in the Te Kauwhata-Huntly region was affected by the hormone dust 2,4D, which wiped out garden plots, ruined flower gardens and killed native trees. The greatest effect of the dust is noticed in the lettuces, tomatoes and grapevines, which have shrivelled leaves and limp stems. A local market gardener said 10,000 tomato plants and 6,000 lettuces four weeks old had to be pulled out. Trees in the area have also shown effects of the dust. Conifers were the worst hit. A whole line facing the direction where the dust was laid have turned completely brown. The total cost of the damage could exceed several thousands of dollars.

New Zealand Herald

16 Setback for Minamata sufferers

The Japanese Government is in retreat. Three of the 15 anti-pollution Bills before the Diet have been dropped and others have been modified as a result of strong pressure from the business community. One casualty is the Bill making pollution a criminal offence, punishable by up to seven years in prison. As originally drafted it would have been enough to show that an individual or enterprise "may have caused" death or injury through pollution. This has been modified so that a causal link must now be proved. Scientific proof and the law being what they are, this is next to impossible. This means that although the identity of industries polluting Japanese waters with mercury and cadmium are obvious, they cannot be successfully prosecuted since no direct causal link can be established beyond doubt.

The Times

17 Break crops speed break even

ICI's farm recording schemes show that mixed arable-meat farms are more profitable than dairy, meat-producing, or arable farms. In 1969 dairy farms increased output only through increased capital investment, and return on capital rose very little. Income from meat-producing farms dropped sharply, while capital investment rose. On arable farms, rising fixed costs have almost eliminated the improved yields—still lower than those of 1967.

However, in both 1969 and 1968, mixed arable-meat farms enjoyed increased output and incomes. ICI's report shows that an arable farm with a grass break between cereal crops does much better than predominantly arable farms.

Financial Times

18 Megajapanopolis

Japan's population is now 104,649,017, according to the latest national census. It has grown by 5.5 per cent since 1965, faster than in the periods 1960-65 (5.2 per cent) and 1955-60 (4.6 per cent). Urbanisation is increasing still faster: 14.7 per cent in Tokyo and more than 11 per cent in Osaka, Hyogo, Kyoto and Nara.

The Times

19 Fewer fish

The world fish catch has fallen for the first time since 1945. From 1945 to 1968 it had tripled to 64.3 million tons,

but in 1969 it dropped by 2 per cent to 63.1 million tons. This is due largely to a decline in the Peruvian anchovy catch, and the depletion of some herring and mackerel grounds in the North Atlantic.

Financial Times

20 Nixon gets tough with industry

President Nixon has issued a special executive order to set up a Federal permit programme under an 1899 refuse Act. This will require all firms and individuals wishing to discharge wastes into rivers to state the nature of the effluent and to apply for permission to discharge it. Guide-lines for 22 major industries were being prepared and they would have to comply with them to obtain a permit. Misrepresentation of effluent in any application will be liable to a fine of up to \$10,000—and a gaol sentence for the person who signed the application. Firms convicted of discharging sub-standard effluent will be assessed a criminal penalty of \$2,500 a day. New plants must obtain permits immediately. Existing ones have until July.

The Times

21 Kenya's plague of children

Almost half of Kenya's population of 11,943,000 is under 15 years old. This, said Mr Mwai Kibaki, Minister for Finance and Economic Planning, is the country's "greatest single social problem". He added that the rapid growth rate of the population (3.3 per

cent, a doubling time of 21 years) is "more alarming than we had thought". Kenyans should be made aware of family planning, and of the connection between population growth and a low standard of living. If the economy grew at 7 per cent, 3.3 per cent would be absorbed to feed the new mouths.

Financial Times

22 More radioactivity for all of us

Atmospheric radioactivity over Britain is increasing. The concentration of long-lived fission products like caesium 137 and strontium 90 for the first half of 1970 was 20 per cent greater than the same period in 1969. The increase is due to the nuclear tests by the Chinese and the French. Global levels have risen 40 per cent. This figure does not include the massive escape of radioactivity from an underground test explosion in the Nevada desert. The US Atomic Energy Commission were concerned to explain that the leak was not in breach of the partial test-ban treaty since the cloud of radioactive materials was dispersed before it reached the Canadian border.

They seem to have forgotten that fission products when dissipated, do not disappear, but are more equitably distributed.

*UK Atomic Energy Authority,
Research group report on radioactive
fallout in air and rain. And
The Guardian*

The Institution of Environmental Sciences

The Institution of Environmental Sciences was formally established on 15 December, 1970, as the qualifying professional organisation for environmental scientists, including those engaged in the advancement, teaching and practice of environmental sciences and in the application of these disciplines in industry and in public service. The Institution aims to further the professional status of those employed in the fields of environmental sciences by laying down standards of qualifications and ethics at a professional level. The Institution has been established to provide the Government and the public with the means of recognising those who have been properly trained and/or proved to be competent to practise environmental sciences as a profession. Lord Burntwood has been elected to the chairmanship of the Institution, and Dr J. Rose to the Directorship.

Enquiries should be addressed to Dr Rose, Blackburn College of Technology and Design, Blackburn BB2 1LH.

Books



The quest for more

WILDERNESS AND PLENTY, the 1969 Reith Lectures by Frank Fraser Darling, BBC Publications, £1.05.

The Reith Lectures occupy the most prestigious broadcasting position. It is indicative of the seriousness with which the environmental crisis is regarded that in 1969 Sir Frank Fraser Darling should have been chosen to deliver six lectures under the general title *Wilderness and Plenty*.

Sir Frank was a pioneer ecologist, one of the first to draw attention to the dangers inherent in our attitude to the world around us. He is Vice-President of the Conservation Foundation in America and his academic reputation is of the very highest. His lectures have now been published in book form.

If the crisis which faces man is as serious as many ecologists would have us believe, then this is no time for mincing words. Sir Frank is very outspoken. At the beginning of his first lecture, *Man and Nature*, he defines the theme of the series as, "population, pollution and the planet's generosity"—meaning the history of man and the effect he has had, and is having on the economy of nature since he has appeared on the planet. The problems are inseparable, but they stem mainly from population. Sir Frank points out that since his youth the world population has doubled and it will double again by the end of the century. He traces this growth, particularly through the twentieth century. It is not so long since young men could talk of carving a living for themselves out of the wilderness. Now the wilderness is disappearing fast as we search for land which will grow food or hold water. He shows how many of the ecological errors of the past are being repeated today.

In his second lecture, *The Impact of Man on his Environment*, he traces the effect growing populations have had. Forests have been cleared for fuel and for land, wetlands have been drained. These processes continue and the total area of wilderness, or natural habitat, is diminishing. As ecological patterns of great complexity have been disturbed so, very often, has the environment deteriorated. As populations grew, hunting became more difficult and people were forced into increasing dependence on agriculture which provided mainly carbohydrate foods. This caused a fall in nutritional standards and, in time, increasing unrest. As Sir Frank says, "Starch and sedition go together."

The impact of man on his environment has reached the point where the United Nations feels obliged to step in with a conference on the subject at ministerial level, to be held in 1972. Sir Frank is not optimistic: "I have no doubts of the intention and earnestness of nations to act well and dress well, as it were. But time, it seems to me, is not on our side. Even by the 1972 Conference there will be over 150 million more mouths in the world, all of whom will be demanding of technology: 'Give us more . . . , not just food, but more of everything.'"

It is this thought which leads him to consider technology "not science but the application of scientific principles to physical problems, very much man-centred." In *The Technological Exponential* he considers the benefits of technology and its drawbacks—the invasion of our last areas of wilderness in pursuit of raw materials, the development of industries which consume resources too quickly, and, most serious of all, pollution. From a combination of pollution and over-use, Sir Frank speculates about a not-too-distant future in which Britain may be short of water and parts of the world short of air. He deals in rather more detail with specific types of water and air pollution, including the eutrophication of lakes and the increase of atmospheric carbon dioxide. It all follows from the desire for higher standards of living, for more and more. Unfortunately, so great is the faith in our technology of the people of the emergent nations that any attempt to warn them of the hazards is regarded as one more instance of the West keeping the good things of life to itself. Yet the hazards are there for them to see. It is the improved irrigation in Egypt, a major technological achievement, which has caused the debilitating disease, schistosomiasis to spread throughout Africa. It is their soils which are eroded when the primeval forests are cleared.

The mood of the lectures is gloomy. Indeed, at one point Sir Frank asks himself why those who think as he does go on? "Is it love of beauty that moves us to the effort, because we know beauty is denied to so many of our fellow men?" It is only when he discusses the work of conservationists that a slight glimmer of hope is allowed to shine through. Even then, "time is not on our side and our present enlightenment may not go far enough."

The last lecture is *Where does the Responsibility Lie?* Sir Frank sees the whole relationship of man to his environment as a moral challenge. He cites our treatment of

farm animals as evidence of declining ethical standards and calls for a new ethic, an ecological ethic. He challenges governments to "boldly face their responsibility to work out population and nutritional policies." We have no choice but to find ways of limiting population growth and then we must re-examine our attitude to the land and to the other species which feed us or which simply share the planet with us. "Care of the wilderness is part of that environmental conservation in which we now include the human being. The exclusion of man from the hierarchy of nature, as common in the past and even in our own time, is to put him in the position of a bourgeois rentier, living off an economy but having no responsibility for it."

The six lectures sum up admirably the present state of the environment and suggest if not remedies, then approaches to remedies. The book is short and, since it is aimed at a wide non-specialist audience, very easy to read and not in the least technical. For this it is valuable. At the same time it is a statement, firm, unequivocal and outspoken, by a leading scientist. Britain needs ecologists of Sir Frank's stature who will declare publicly what they believe: if their warnings are to be heeded, they must be heard. This, in my view, is the real importance of the lectures and of Sir Frank's contribution to the debate. The warning has been spelled out. We must all hear it; none of us dare ignore it.

Michael Allaby

Deer in Britain

FALLOW DEER, by Norman and Donald Chapman. **MUNTJAC**, by Oliver Dansie. **SIKA DEER**, by M. T. Horwood and E. H. Masters. **ROE DEER**, by Peter Delap. **RED DEER**, by Peter Delap. 20p each or £1 the set. Available from the British Deer Society, 43 Brunswick Square, Hove 2, Sussex BN3 1EE.

The British Deer Society exists to study the deer of this country; to promote proper and humane methods of management, conservation and control of deer; and to give advice on all matters concerning them. It is currently preparing a National Deer Distribution Scheme, and to mark European Conservation Year it published these five booklets. They are intended to "encourage deer-watching by the uncommitted", and as long as the uncommitted (presumably those who aren't foresters, stalkers or members of the Society) get to know of them they should do the job admirably. They set out the basic information on each species' distribution, description, habitat, food, communications, behaviour in rut, antlers, and the damage they do to trees. All but the one on Fallow Deer have a separate section on the animal's annual cycle, one of the more useful features for the beginner, and a distribution map. Unfortunately the distribution maps are so small as to be virtually useless, and the reader will find the county by county summary in Whitehead¹, now a little dated but still the best there is, much more help-

ful. But this is a minor defect in a set which is remarkable both for the elegance of its design and the clarity of its exposition. I hope it will bring many more people to study and value these magnificent animals.

Robert Allen

¹ Whitehead, G. K. 1964. *The Deer of Great Britain and Ireland: an account of their history, status and distribution*. Routledge & Kegan Paul.

Eco-archaeology

LANDS OF THE MORNING by Lawrence D. Hills, Regency Press, £2.

The serialisation of Thor Heyerdahl's "Quest for the Sun God" in *The Observer*, has stirred interest in the mysterious, tall, bearded, white men who began the civilisations of South and Central America. No other Continent has this tradition, which has been used to support theories ranging from "Atlantis" to Thor Heyerdahl's papyrus raft loads of ancient Egyptians, whom most archaeologists will regard as too civilised, too early, too short and too dark.

Lawrence Hills in "Lands of the Morning" explores the possibilities of the Atlantic islands, present and mythical, as possible sources for these men without knowledge of the arch or metals, but skilled in trepanning, mummifying their dead and making pottery without a wheel. As he says, "Orthodoxy ignores the problem, unorthodoxy ignores the evidence", and the arrival of a succession of parties and individuals of a stone age race in America between roughly the date of

Caesar's first landing in Britain and the middle of the 14th Century, is a mystery for which this book offers an interesting and most likely solution.

Isolated islands are closed ecosystems, miniature worlds that Man can alter irreparably by carelessness and greed, or fit into as a permanent part of a shared environment. The contest between Man the conservationist, locking his customs in isolation, limiting his wars and weapons to preserve the race, and using only the income from natural resources, and Man the inventor, explorer and changer, is the underlying theme of this book. It is of importance to us all, for "space-ship Earth" is only an isolated island in the seas of space.

The chapters that tell the story of the Guanches, the neolithic farmers who sailed in dugout canoes to the Canary Islands about 4000 BC to escape from a world that was inventing bows and arrows, are vivid and absorbing. They exterminated the giant tortoises and flightless birds, but reached a stable balance between forests and mountain pastures and their flocks of sheep and goats—the only example in history of goats without deserts. Sixty centuries of stone age conservationists kept the islands green and lovely, with a living standard for all that made Greek and Roman visitors call them the "Fortunate Islands". Today, little more than five hundred years after the Spanish conquest, the wells must bore deeper and deeper for the needs of bananas, tomatoes and tourists in a land of drought, and sheik and foreign legion films are made in the closest desert to good hotels and airports,

where once grew a forest of the largest canoe building trees in Europe.

We share our ancestry with the people of this most "lost" of all civilisations, for they also voyaged from the Iberian Peninsular to England where their descendants built Stonehenge, but their story has never been told in English. They held out for ninety years of stone against steel and went down fighting only a few years before Columbus sailed from the Canaries along the easy sea route that has carried less seaworthy vessels from Dr. Bombard's rubber dinghy to Thor Heyerdahl's "Ra".

Behind the often exciting narrative, based on medieval French and Spanish accounts of the conquest and modern Spanish archaeology and history, are deeper implications. Lawrence Hills is less of an archaeologist than a horticulturist and ecologist, and though he gives a graphic account of the "chinampas" of Mexico, the strange water gardens in which the Aztecs used soil block pots centuries before Europe developed clay ones, he relates his story to the world of today.

The faults of this book are from overcrowding. The story of Captain Robson of the steamer *Jesmond* in 1882 would make a book on its own, and so would the account of the Portuguese bishops who escaped from the Moors with a party of refugees in AD 734, and founded the Island of Seven Cities, but Lawrence Hills has evidently allowed himself a holiday from the tightly written, fact packed gardening articles and books for which he is well known.

Charles Gopher

CLASSICS IN HUMAN ECOLOGY is a series of new editions of significant books about ecology which merit re-publication at a time when their message is even more vital.

VOL. 1

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2nd edition

by Sir George Stapledon

This completely new, revised edition of Stapledon's book has been prepared by Robert Waller, and the principles expounded in the work form an essential study for anyone concerned about Man's survival. The ecological revolution advocated in the book can only be achieved if man creates and orders a stable state on the author's ecological model. Stapledon's thesis is that a considerable unbalance exists in our way of life—Man's adaptability is the key to his progress, but it also enables him to create an environment that threatens to engulf him. The author's classical research in agriculture points the way to future action.

£2.25

THE DISCIPLINE OF PEACE

2nd edition

by K. E. Barlow

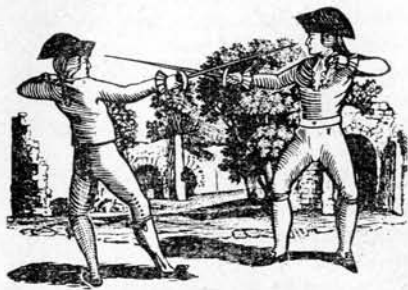
The original edition of this work drew the reader's attention to the ignorance of political philosophers and social planners of the laws concerning man and his natural environment. A generation later the author's message is still quite clear—Man requires to recognise his situation, and then the possibilities of action may appear.

In preparation

CHARLES KNIGHT

11/12 Bury Street
London EC3A 5AP

Letters



Conservation Corps

Sir,

It appears that Mr McAuley has totally misinterpreted the reasoning behind Mr Allaby's remarks concerning the limited advertising given by the Conservation Corps to attract volunteers.

The Conservation Corps has never been short of recruits; it has always been short of money with which to finance the necessary vehicles, equipment, leaders and administration needed to satisfactorily undertake the work in the field.

This type of voluntary organisation must ensure that a high standard of leadership and quality of work is constantly maintained. In addition, it is equally important that newly enrolled volunteers are not disappointed through a lack of task vacancies.

During 1970, with little advertising towards volunteer recruitment, we have enrolled constantly over 100 volunteers per month and at the same time we have expanded our work programme by 65 per cent. With over 10,000 work-days guaranteed for this year (against 6,000 last year) we are expanding to the limit of our available financial resources.

It is therefore the policy of the British Trust for Conservation Volunteers to attract publicity by maintaining a high standard in the field which in turn leads to further requests for volunteer services and more opportunities for individuals and groups to help. To do the reverse would mean swamping the organisation with thousands of frustrated volunteers backed by little finance, resulting in fewer projects being completed at a lower standard. To achieve the controlled expansion along these stated policy lines the British Trust for Conservation Volunteers is now appealing for £200,000 to regionalise the Conservation Corps and provide for future growth.

Yours sincerely,

R. D. Jennings.

Field Director, Conservation Corps,
Zoological Gardens, Regent's Park, London,
N.W.1.

Self-determination for Wales

Sir,

May I congratulate you very warmly on the September issue of *The Ecologist*. I was interested to read in the article on Severnside

how the interests of public health, amenities and the environment have all been neglected in the furtherance of economic development, which as your contributor points out, has all too often been thought of as "unquestionably a good thing".

It is our feeling that thoughtless economic expansion may often threaten not only the environment, but also community values. This is the reason for our opposition to the Severnside and Deeside schemes which would both create vast megalopolises, destroying what has been left to us of the Welsh life and values of the south-east and north-east of Wales.

On the other hand, where economic expansion is really necessary to maintain community life—in the valleys and rural villages of Wales—it is conspicuously absent. It is almost as if the economic juggernaut is determined to eradicate all that is best in our social life and tradition. Perhaps it is no coincidence that interest in the environment is growing at the same time as nationalism in these islands.

In another article Mr David Evans presents a case for devolution and federalism. There is much in this with which we in Plaid Cymru would be in full agreement. Perhaps our only objection would be that it does not go far enough in placing control into the hands of the people. If Wales is a nation, and should be allowed to control her economic life, why should she not also have control of her relations with her neighbours? It is highly unlikely that we would wish to sell arms to South Africa (as do the Conservatives) or to Nigeria (as did Labour).

Yours sincerely,

Dafydd Williams.

Assistant Organiser for South Wales,
Plaid Cymru, 8 Heol y Frenhines, Caerdydd,
Cardiff.

What about the fish?

Sir,

Catching up on accumulated journals and reading "Mrs. Butler's Bill" in the September issue of your journal, I see that derris and pyrethrum are cited as being "entirely safe" with the implication that they are safe for wildlife. I think your readers should be told that both these substances are extremely poisonous to fish and have caused heavy fish kills when introduced as agricultural sprays or dusts, or in run-off from agricultural land.

Yours sincerely,

Pauline K. Marstrand.

The University of Sussex, Science Policy
Research Unit, Falmer, Brighton, Sussex.

Positive feedback

Sir,

It occurred to me recently that your readers might like to hear of a way in which your magazine has influenced research in a field which has seemingly little connexion with environmental problems.

I am currently reading for a research degree in Education, and my brief is to investigate hierarchic systems of order in creative behaviour from a philosophical and psychological viewpoint. I was, therefore, very interested to read your three articles in *The Ecologist* in which the notion of increasing cybernetic order (as opposed to that of increasing environmental order) seems to concur with the theoretical basis of my own work. What I am attempting to show is that the vast amount of research studies in creativity (5,676 by 1965) now needs a form of conceptual synthesis which only a theory like the one you propose can give.

I had reached this point of view independently when I began to read the articles in *The Ecologist*. It is thanks to them that I have now been able to add an ecological dimension to my discussion: Up to the present, the basic imperative behind creativity-research has been an industrial-scientific one, with aesthetic promptings coming a close second; it now seems to me that our attempts to study and nurture human creativity must take into account the ecological aspect, if we are to avoid encouraging rank spurts of growth in an uncoordinated fashion, thus strangling our environment with discoveries that work against each other. This is of course most obvious in the industrial area of culture, as any of the major articles in your magazine point out, but it also seems applicable in the aesthetic area, where, partly as a result of the fad of creativity, we seem to run the risk of being "polluted" by an excess of arts graduates (I note your August issue, p. 16, has something to say on this). After all, a definition of "pollution" could well be: "the production in excess of any material which an ecosystem cannot absorb" and why should this not be applicable to our cultural institutions? It is your point about optimum size again.

I should like to thank *The Ecologist* for having confronted my research with the most urgent of problems, and for pointing the way to a new synthesis.

Yours sincerely,

Roy Webberley.

10 The Mews, Kenilworth, Warwickshire.

Oil consumption

Sir,

I was interested to read in the October issue of *The Ecologist* in Feedback, No. 21 (Oil Priorities) of the amount of fuel used by SST's as I have also recently read that the world's supply of oil could well be exhausted by the end of the century.

I think it would be very useful to show the relationship between fuel used (perhaps expressed in calories) per person per mile, for numerous forms of transport ranging from airships to SST's (and rockets!), motor cycles to diesel driven trains and motor boats to ocean liners.

In addition it would be particularly illuminating to express the relationship between the time taken to form the oil and the amount used per person per mile by showing how many years (of oil formation) were re-

quired for each type of transport (e.g. it might take 1,000 years to fly to New York by Concorde).

May I suggest that this could be the subject of an article very soon.

Yours sincerely,

J. D. Wigg.

72 Brattle Wood, Sevenoaks, Kent.

Recycling

Sir,

As it is *The Ecologist's* task not only to prevent pollution, but also to prevent waste, I feel that a great stride forward could be made, and with little difficulty, if waste in the packaging of articles was reduced.

One of the worst examples is the way in which millions of perfectly good screw-top no-deposit bottles are thrown away each day, just because the drink producing companies and their distributors will not go to the trouble of collecting them.

Another example is the terrible waste of cardboard and paper in the packaging of such things as gifts and toys. Everything these days is wrapped profusely in order to make it look bigger or better than it really is. All this means millions of tons a year of wasted paper, and that means whole forests of trees unnecessarily cut down.

To see such things in shops as birds attached to great pieces of cardboard, or the excessive packaging of children's presents, I find most annoying. For instance, I have here a children's toy of total volume about 200 cubic inches set in cardboard in an

enormous box of volume, 1,000 cubic inches.

And that is not all. Should we not stop wasting millions of tin cans a day, by having a separate dustbin for them, so that the steel could be retrieved?

I think that an article on this subject would be a very good one to have in your excellent magazine.

Yours sincerely,

Mark Steinhardt (16).

13 Cedar Way, Slough, Bucks.

Systemic management

Sir,

The first five issues of *The Ecologist* have made an outstanding contribution to awareness of environmental problems, and I trust that your future publications will maintain the high standard you have set. At least the introduction of *The Ecologist* is one significant event in European Conservation Year.

The range of problems you have discussed, and their inter-relationship make a philosophy of "divide and rule" (Mr McNaught's letter in the November issue) an unsatisfactory approach. The creation and application of solutions is achieved through a series of steps, but one is crucial, namely the decision to act or not. It is valuable to examine the actual process of decision-making, especially the criteria which are examined when decisions are made. We have been familiar for a great many years with the need to test possible courses of action against three criteria:

Will it work? or Technological feasibility

Will it pay? or Economic viability

Will it be acceptable? or Political expediency.

We are less familiar with the significance of additional criteria, or at least pay scant attention to their importance:

What will it do to individuals? or the Psychological effects

What impact will it have on groups or the society? or the Sociological effects

What effect will it have on the natural environment? or Ecological sanity.

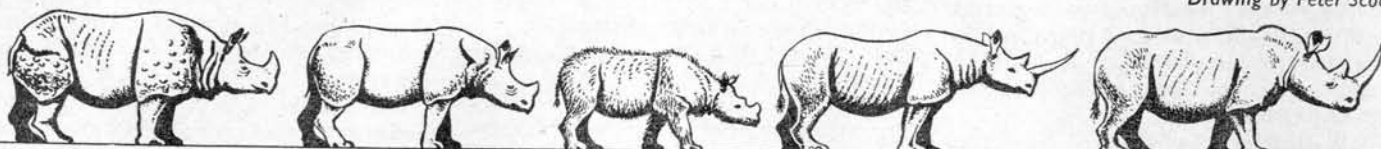
The dumping of nerve gas, use of nuclear power, Concorde, the third London airport are all examples of more reliance being placed on the first three rather than the last three criteria. There is also a time dimension to all these criteria, which requires assessment of both short and long term effects. Before this can be widely used there must be developed the methods of measurement appropriate to each criterion. A person's health cannot be judged by examining his bank balance, or his income, and likewise the quality of the environment cannot be expressed in economic terms. You could contribute to the development of more effective decision-making by stimulating work on these lines. There is a great need to adopt "systemic" management for all decision-making.

Yours sincerely,

Colin Hutchinson.

Chairman, Surrey Branch, The Conservation Society, Kingswood, Beatrice Road, Oxted, Surrey.

Drawing by Peter Scott



Great Indian

Javan

Sumatran

Black

Square-lipped (White)

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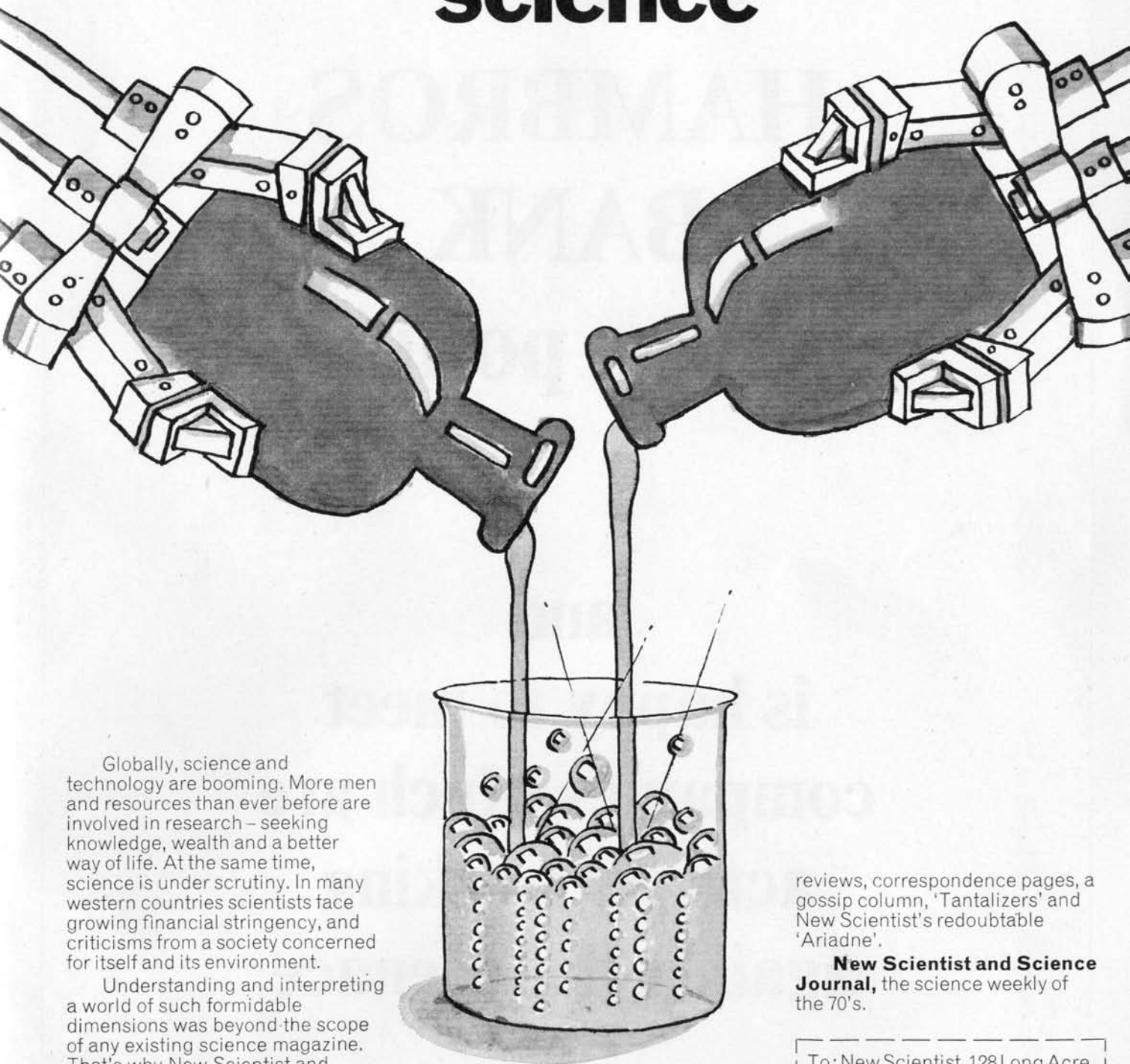
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A new formula for communicating science



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