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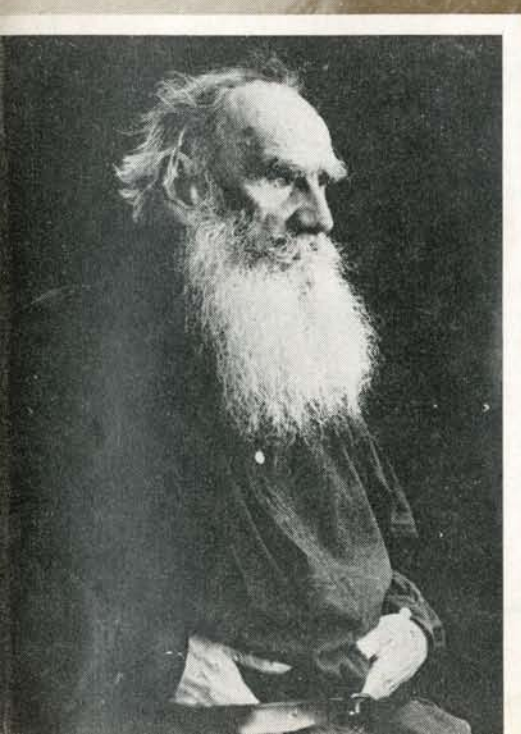
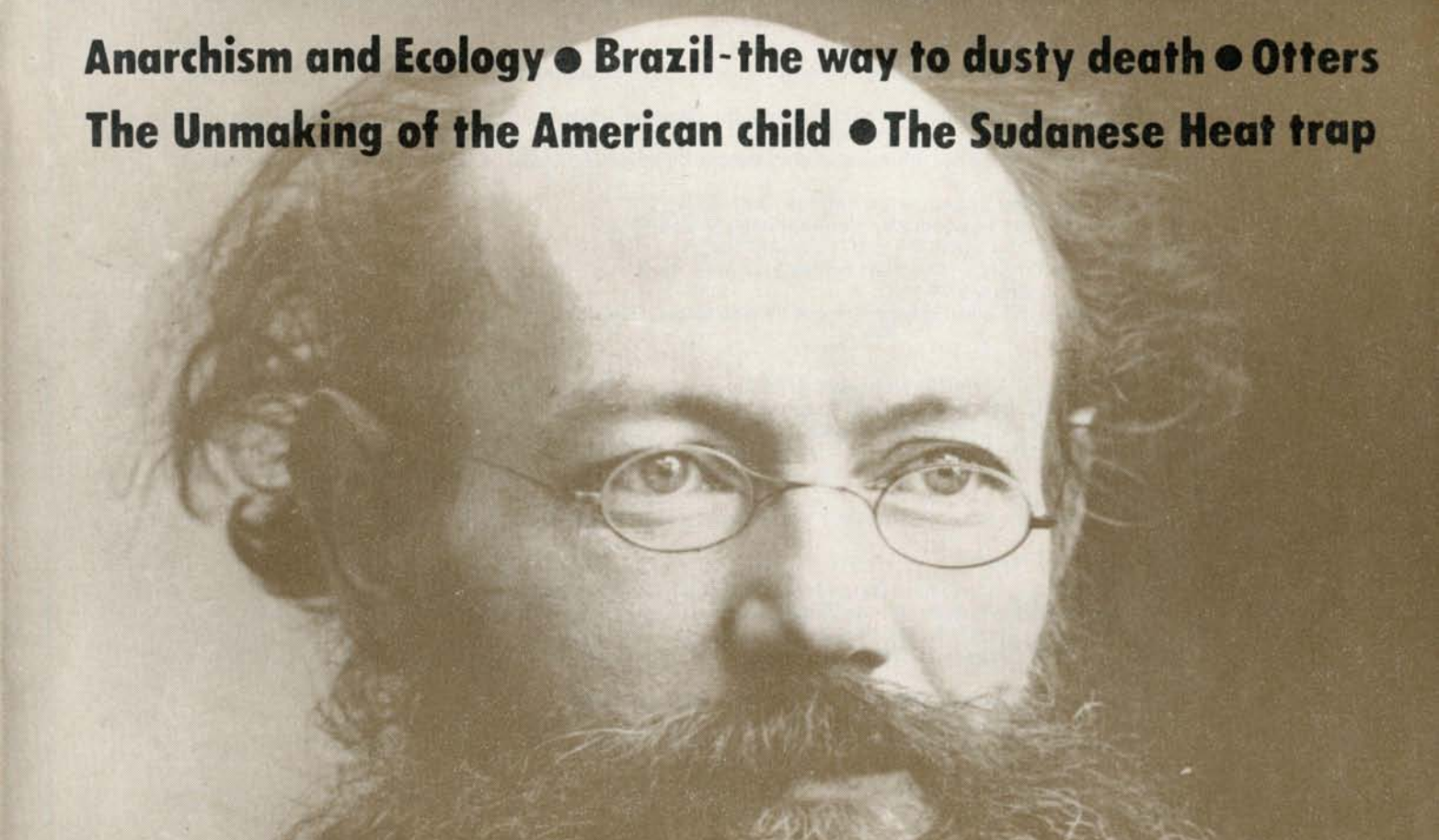
Ecologist

Journal of the Post Industrial Age

Vol.4. No. 3

MARCH/APRIL 1974 25p

**Anarchism and Ecology • Brazil-the way to dusty death • Otters
The Unmaking of the American child • The Sudanese Heat trap**



**Anarchists
or
Ecologists?**



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NOTICE TO SUBSCRIBERS

Owing to circumstances largely beyond our control the 1974 issues of THE ECOLOGIST have appeared a month late. To remedy this situation we are now publishing a joint issue for March and April. We hope to compensate our subscribers for the missing issue by producing a special double number later this year.

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Comments

The Caviar Chimera

The idea that only rich nations can afford a clean environment is perhaps one of the most naïve of all the excuses for more economic growth. Guilty of it is Lord Zuckerman, former Chief Government Scientist. He recently said, "The big lesson we have learnt is that all environmental improvement depends upon scientific and technical progress. These create both the knowledge of how to avoid pollution and the *wealth needed to avoid it*".

Guilty of it too is Anthony Crosland, our Secretary of State for the Environment. He writes, "Even if we stopped all further growth tomorrow we should still need to spend huge additional sums on coping with pollution, and it will, for example, cost hundreds of millions of pounds to clean our rivers of their present pollution. We have no chance of funding these huge sums from a near static GNP any more than we could find the extra sums we want for health or education of any of our other goals. Only the rapid growth would give us any possibility."

Guilty too, is the World Bank whose experts wrote in their report on the Limits to Growth, "The authors do not fully allow for the fact that higher levels of industrial development also increase the options of these societies to take care of the pollution problem by devoting additional resources to them."

They forget that when our holiday makers seek an unspoilt environment it is not to Detroit, the industrial midlands or the valley of the Ruhr to which they travel but to those so called underdeveloped places which have so far been spared the 'benefits' of economic growth.

In addition there appear to be several phases in the development of

an industrial society, and as we proceed from the first to the last so is economic activity increasingly destructive. For instance, in the earlier phases such as those through which the Africans or even the Chinese are now passing, the attitude to waste is very

different from that to which we are accustomed. The Chinese are taught in school to struggle against the four wastes "—waste material, waste gas, waste water and waste heat". Litter is regarded as useful, something to be collected and reused. As affluence



"Do you mean to say that he lives here all year round? Gee Pop! he must be rich."

grows with increasing economic growth so is there a tendency towards a sloppier attitude to waste.

When we have reached the present phase, further growth only becomes possible by substituting synthetics for natural products: synthetic fibres for natural ones, detergents for soaps etc.

Indeed it is Professor Commoner's thesis that it is this process which has given rise to the present pollution crisis in the US in which many pollution levels have gone up between 200 per cent and 2,000 per cent since the war. He maintains however, that it would be possible to abandon such technologies without reducing affluence, forgetting that their replacement with the labour-intensive production of natural products must reduce per capita GNP and hence put economic growth into reverse.

Consider the pollution of our waterways. Industry pours thousands of different chemicals into them every day. As Pastakia points out in a letter to *The Times*, "discharges are often at low levels of concentration which escape detection and are not shown up by fish kills, but whose cumulative effect on the aquatic environment can be extremely damaging." This appears to be true in the case of the hormone weedkiller in Essex which did considerable damage a few months ago at concentrations as low as one part in a thousand million. As Sturgess of the Essex River Authority points out, also in a letter to *The Times*, "present methods do not even enable one to detect the presence of pollutants in this dilution, let alone face them".

If one cannot detect them, still less can one eliminate them by any known purification process.

Even if one could, could we afford to do so. As it is pointed out in the *Limits to Growth*, the cost of reducing pollutants from say a factory chimney increase exponentially as we try to achieve higher levels of purification. An 80 per cent reduction in pollution is generally regarded as ambitious. To do better is generally prohibitive. Even then, with World Economic Growth at 6 per cent per annum, it would merely take 27 years for total pollution to equal that which obtained before controls were introduced.

They also forget that many forms of pollution cannot be controlled at all. How, for instance, does one reduce pollution by pesticides or by artificial

fertilisers save by not using them. There is also no known method for dealing with radioactive waste. The more nuclear power-stations we have the greater the amount of high level waste that will be precariously stored in artificially-cooled steel-lined concrete containers and the more low level wastes will be poured into the seas, ultimately to render them uninhabitable to complex forms of life.

They also forget that it is impossible to make any technological device, which is totally exempt from a possible breakdown. Cars break down, so do aeroplanes. This is not too serious but it is much more so when a nuclear power-station or a waste retreatment plant goes wrong; and so they must on the basis of sheer probability. Even the Atomic Energy Commission admit that with the number of nuclear power-stations likely to be in operation by the end of the century, we must expect at least one accident a year; and at this rate it doesn't take many decades for our planet to become inhabitable.

It is probable however that the AEC, like Zuckerman, Crosland and company have not understood that pollution-control is not simply a technical problem. One can have the best nuclear power-plant in the world, but what happens if someone sets out purposefully to sabotage it? What happens if key workers go mad? and let us not forget that sabotage and madness are increasing exponentially in our increasingly unbearable society. Also, we can have the best sewage-works in the world but what happens when the sewage workers go on strike as they did in London last year? With worsening industrial relations this must happen ever more often.

They also assume that as a society becomes more affluent so it will be willing to spend ever larger sums on pollution-control. Pollution however, is only one of the side-effects of economic activity which impose increasing stresses on social and biological systems. It is to these stresses that can be attributed the new diseases largely unknown to man living in his natural habitat: cancer, ischaemic heart disease, diabetes, tooth-decay. It is also to these stresses that can be attributed the present epidemic of crime, delinquency, drug-addiction, alcoholism, and general chaos. The only 'solution' our society has to offer to these problems as to that of pollution is techno-

logical. This means ever increasing government expenditure to counter the side-effects of economic growth. This also means that the government has ever less money to spend on a single side-effects such as pollutants.

They also forget that the current explosion in the price of energy and resources has also been caused by excessive economic growth which is increasingly depleting the earth of its finite stock of resources. This is only the beginning, yet it has already given rise to a strong reaction against environmentalists. Lobbyists in Washington are today saying that the best way to keep warm this winter is to burn the Environmental Protection Laws. The most popular car sticker in New York is, "Ecologists, let the bastards freeze in the dark." There has been a veritable avalanche of anti-environmental measures: President Nixon has called for the relaxation of air quality laws. Congress is giving auto-manufacturers another year to meet exhaust emission standards. EPA is being stripped of its power to levy federal taxes on urban parking space to reduce traffic congestion. Forty-five power plants which had been ordered to switch from oil to coal will be allowed to burn the dirty fuel. Congress has approved the construction of the Alaska pipeline and exempted it from further challenges under the National Environmental Policy Act which, as *Newsweek* points out, sets "a precedent" for similar exemptions for other energy projects including capping offshore oil reserves and oil shale deposits.

Taking all these considerations into account it should be clear that technology cannot provide a solution to the pollution generated by our ever increasing industrial activities. Technology can only solve technological problems. It has nothing to offer against the logistic, the economic, the biological, the social and the political aspects of the problem *which our 'experts' are quite incapable of even taking into account.* Lord Zuckerman, Mr Crosland, the World Bank etc. must be made to understand that it is dangerously irresponsible to suggest that it is remotely conceivable to have a clean environment in any other way but by reducing man's impact on it, which must mean proceeding with the systematic de-industrialisation and de-centralisation of our society. *Edward Goldsmith*



PETER KROPOTKIN 1842-1921

Anarchism and Ecology

With remarkable, even prophetic insight many 19th century anarchists and their followers foresaw the severe social and environmental problems that we now see clearly to be an inevitable consequence of industrialisation and development. Anarchists such as these were therefore the forerunners of contemporary environmentalists who today appreciate that destruction and despoliation of the environment has more to do with a social system that has gone pathologically wrong than with inadequate measures of conservation or pollution control. The majority of anarchists believed that man should live in close harmony with his fellow beings and his environment. With some justification it can be said that anarchists were the first true ecologists.

by George Woodcock

In 1899 the Russian anarchist Peter Kropotkin, exiled in London, published his *Fields, Factories and Workshops*, a book that should be, if it is not already—one of the canonical texts of the ecological tradition. In *Fields, Factories and Workshops* Kropotkin dealt with many problems that concern the ecologist today. He was disturbed by the centralisation of population and industry in large, unhealthy agglomerations; he was disturbed by the wastefulness of both industrial and agricultural production in his time, and he calculated that by using proper means of conserving fertility, England could be made agriculturally self-supporting; he believed in the integration of work and education, so that training in productive processes would give academic learning a basis in the reality of social action; he believed also in the integration of agriculture and industry, so that small production units could be scattered over the land and no worker need feel isolated from rural life or from what survived of the wilderness. Patrick Geddes, Lewis Mumford and other notable precursors of the contemporary environmentalist movement have acknowledged their considerable debt to Kropotkin, and Mumford's proposals for large-scale decentralisation in *Technics and Civilisation* were little more than Kropotkin plus electricity.

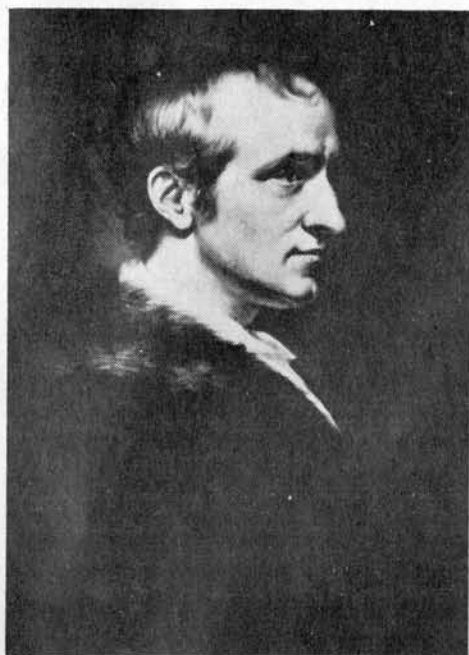
Unless my Oxford English Dictionary is misleading me, ecology was first recognised as a branch of scientific theory in the 1870s, the decade in which Kropotkin became an anarchist and

developed his theories of aparchist-communism (most thoroughly discussed in *The Conquest of Bread*—1906). These theories depended largely on reversing the trend towards political and economic centralisation that had been building up since the renaissance, and which stressed the view that in our calculations of social needs we should proceed not from the top—the state or the industrial corporation—but from the level where people came together in direct personal and working relationships, the level at which human needs could most realistically be discussed and must directly determined.

In fact, in developing anarchist communism, Kropotkin was only refining on tendencies that were evident in anarchism ever since William Godwin wrote the first great exposition of the doctrine—*Political Justice*—in the 1790s. Godwin called the local units parishes; Proudhon and Bakunin were more interested in self-governing workshops and communes; all of them stressed the need to base social organisation on natural laws, and Kropotkin reinforced this concept in his *Mutual Aid* (published in 1902 after the material had appeared as a series of essays in *The Nineteenth Century*). There he related the social responsibilities which he found characteristic of men when they were undisturbed by coercive institutions with the sociality he found so widely spread among animals. Kropotkin wrote *Mutual Aid* in a mood of reaction against the fashionable neo-Darwinist doctrine which portrayed

nature, in Tennyson's unfortunate phrase, as "red in tooth and claw" and saw the struggle for existence as necessarily a struggle between individuals and species. As a field geographer of considerable experience in eastern Asia, Kropotkin found that a number of field naturalists agreed with him in deploring this essentially competitive view of evolution, and it was actually with the encouragement of H. W. Bates, author of the classic *Naturalist on the River Amazon* and a close associate of Darwin, that he put forward his argument that the struggle for existence was in fact the struggle against adverse circumstances rather than within species, and that one of the most potent forces in evolution and in sustaining the balance of the world of nature was in fact co-operation. Since he was concerned mainly with what happened within species, Kropotkin did not explicitly delineate the complex pattern of mutual dependencies which the modern ecologist sees when he looks at relationships within the natural world, but the existence of that pattern was certainly implied, especially in the extent to which Kropotkin sought to prove that the law of mutual aid was universal in its application, embracing man within the same natural continuum as all the animals and basing his own development as a social being on the same principle as that which ensured the survival of other species from the insects up to the higher mammals.

Thus, since they were aware of the extent to which a healthy life in bio-



William Godwin 1756-1836.

logical terms was dependent on mutual aid on every level, and saw clearly the analogies between animal and human societies, there is little doubt that the classic anarchists would have been—as their successors are today—deeply in tune with the concerns of modern ecologists. Kropotkin's particular contribution—apart from the theoretical contribution in *Mutual Aid*—was to relate anarchism through concrete proposals for industrial and agrarian reform in books like *Fields, Factories and Workshops* to the movement for conserving the environment in the interests of a richer way of existence, a movement that has come to maturity only in recent decades under the pressure of mounting ecological disturbance and rapidly diminishing resources of fuel and raw materials.

Anarchism, which has been in existence for well over a century as a distinctly identifiable political movement, and which in theoretical form dates from the publication of Godwin's *Political Justice* a hundred and eighty years ago, has taken many forms during its history, since unlike Marxism it never developed a body of orthodox doctrine or a close organisational structure, both of which would have negated its emphasis on spontaneity as a manifestation of freedom. Some of the forms it took resulted in sensational publicity and aroused extreme hostility; there were times, for example, when fanatical anarchists—like the fanatics of other movements—resorted to the assassination of rulers and to other terrorist acts. But such extreme anarchists were

always a small minority, and there were others, like Tolstoy, who believed that the anarchist rejection of coercion meant automatically a rejection of violence; Gandhi called himself an anarchist of this kind.

More important perhaps were the differences in anarchist views of how society should be organised economically and politically, and of how the change from an unfree society could be effected.

Grass roots organisation

Essential to all anarchist doctrines was the belief that if man was not naturally good, he was at least naturally social, and that coercive government destroyed this natural sociality. All anarchists have also concluded that massive centralised organisations of all kinds carry within themselves the dangers of coercion, and they have therefore invariably related the voluntary principle to social, economic and political decentralisation. Organisation, they argued, should begin at the grassroots level, so that people in small groups and limited localities can control everything that affects them immediately and concerns no-one else. As wider interests become involved, anarchists favoured not co-ordination imposed from above, by some remote and over-riding authority, but the application of what they called "the federal principle". By this they meant that the common affairs of a town should be managed by a federation of streets and localities, sending delegates to town meetings, with initiatives starting up in the localities, and that society should be federated upwards, from town to district, from district to region, and so forth, but always with the power of decision rising upward from the simplest level rather than stemming downward from some central power. The relevance of such a view of social organisation to the concerns of ecologists will be evident, for the potentiality of environmental disaster is always recognisable first at the local level. Indeed centralised administrations are more likely than decentralised ones to ignore environmental danger signs in the interests of so-called national welfare or even of openly-admitted corporate interests.

Parallel to the constant anarchist emphasis on decentralisation one can isolate another attitude (for it can hardly be classed as anything so definite as a theory) that relates the an-

archists to modern ecologists. It is an inclination towards the simplification rather than the progressive complication of ways of living.

In theory, the earlier anarchists actually tended to share with nineteenth century socialists the belief that if the world's resources were properly managed, there was no limit to the physical abundance that human individuals could enjoy; it was such an assumption on Godwin's part that led Malthus to bring forward his celebrated arguments on the limits of natural resources and their likely effect on progress and on population. Because the nineteenth century world was still—in terms of 1974—scantly populated, and because the expansion of available resources throughout the century was always in excess of the powers of consumption at the current state of technological development, Malthus's warnings went unheeded by the anarchists as they were by most men before the 1960s.

Yet with the anarchists there was a compensating factor. By temperament they were always inclined to favour a modest and even an austere way of life. The reasons for this inclination were complex. There was a certain essential puritanism in the anarchist viewpoint; they were inclined to regard the rich as victims to be pitied as well as villains to be condemned, a duality of perception not uncommon among the religious fundamentalists to whom the anarchists have always been the closest secular counterparts. At the same time, the anarchists not only felt that human life should be as spontaneous and as natural as possible (and hence as untrammelled by material attachments), but also that the goal of affluence introduced the perils of economic centralisation and hence of political authority. For these various reasons anarchist thinkers as far apart in time as Pierre-Joseph Proudhon in the mid-nineteenth century and Paul Goodman in the mid-twentieth advocated the goal which Goodman called "a dignified poverty", the simplification of life which would lead to a simplification of social and economic organisation. Anarchists, and libertarian socialists who closely associated with them, such as Tolstoy and William Morris, became deeply concerned with the dehumanising effects of machine technology, and, while neither Morris nor Tolstoy absolutely rejected the use of machines where there was a



Leo Tolstoy 1828-1910.

question of eliminating some degrading form of menial work, both they and their followers looked towards a future in which the manual crafts would return, and the human and environmental destruction caused by the industrial revolution would come to an end.

In India, where a pre-mechanical village society not only survived into the days of the British Raj, but embraced a great majority of the population, Gandhi—who was greatly influenced by western anarchists like Tolstoy, Kropotkin and Thoreau—planned to create a village-based society with an economy based on handicrafts and a simple, ascetic way of life. This was not merely an Asian adaptation of anarchism; in Spain, during the early months of the Civil War in 1936, many villages of Andalusia, where the anarchists had a following among the farm-workers, expelled their landowners, communalised the land, and then proceeded to set up self-sufficient local economies in which they sought to simplify their needs in the interests of village autonomy. But, as observers noted, their goals seemed to be moral as well as politico-economic; they welcomed the unavailability of luxuries like alcohol and even of coffee with the feeling that their lives had not merely been liberated but had also been purified.

The important aspect of this tendency is not the latent puritanism it uncovers in the anarchist temperament, but rather the fact that alone among the parties of the left, the anarchists—unlike the liberals, socialists and com-

munist, and the various nationalist movements—were uncommitted to the goal of constant material progress, to the philosophy of the growth economy. They were willing to consider that the good life, the free life, might not merely be possible, but might even be more attainable and defensible within the context of a more selective approach to technological development, an approach which did not assume affluence to be a necessary good. They were even willing to accept what in conventional liberal or socialist terms would be regarded as retrogression, provided this brought benefits of a less material kind. And this inclination, it should be observed, was present among anarchists at the same time as they denied or ignored Malthus's arguments regarding the relationship between the pressure of population and the limitations of natural resources.

As a historic movement anarchism did not exactly fail to prove the validity of its scheme of a decentralised libertarian society. It never, in any broad sense, had the opportunity to do so. Because of their distrust of excessive organisation, anarchists were slow to adapt themselves to the dominant economic trends of the nineteenth century. Proudhon sought to perpetuate as far as possible a society of independent peasants and artisans, whose land and workshops would be guaranteed to them as lifetime "possessions" and who would exchange their products by a system of labour cheques. Only reluctantly did he grant that the development of the factory system and of the railways demanded workers' associations to operate larger units of production and communication. Even when later theoreticians, like Bakunin and Kropotkin, developed anarchist schemes for the collective ownership of the means of production and distribution (on the basis of the classic slogan "From each according to his means, to each according to his needs"), the individualism and localism of the anarchists was reflected both in their views of political organisation (they clung very strongly to the idea of the "commune", which corresponded to the village or the urban quarter, as sovereign both economically and politically) and in their idea of revolutionary tactics, based on the method of individual action by militants (the so-called "propaganda of the deed") which it was hoped would by example induce

the populace to rise in spontaneous insurrection, destroy the evil and oppressive structure of the state, and in its place create the natural units of a free co-operative society.

This was essentially a romantic vision, and though the anarchists were powerful enough to challenge the Marxists in the First International, during the 1870s, and to build up strong followings in Latin and Slav countries, they were unable to create stable mass movements largely because their localism permeated even the organisation of their movement. After the break-up of the First International into anarchist and Marxist factions, both of which perished quickly, no stable anarchist international organisation was created, though there was a great deal of world-wide contact among anarchists, fostered by the wandering of constantly exiled celebrities of the movement like Peter Kropotkin, Enrico Malatesta and Emma Goldman. Even nationally, only in a few countries like Spain and Italy did anarchist federations show even a modest durability.

Instead of preparing for an apocalyptic revolution, contemporary anarchists tend to be concerned far more with trying to create, in society as it is, the infrastructure of a better and freer society.

The repeated failure of anarchist insurrections in Spain and Italy during the 1870s and 1880s, and the hostility aroused by the subsequent wave of individual terrorism, had reduced the anarchist movement by the 1890s to a rump of dedicated militants and of symbolist writers and painters; indeed it seemed little more than one of the many forms of eccentric fantasy in which the morbid mood of the fin-de-siècle manifested itself. (Though even then there were anarchists who in progressive schools and agrarian communities and in various fields of artistic experimentation were developing the more constructive manifestations of the anarchist vision).

But in fact, at this very time anarchism was on the eve of one of the great resurgences that have punctuated its history. During the later 1880s the mood of reaction that in France had followed the defeat of the Paris Commune of 1870-71 (in which many early



Pierre-Joseph Proudhon 1809-1865.

anarchists, including the painter Gustave Courbet, had played an active part) was relaxed and not only left-wing political parties but also trade unions were allowed to operate. Since they regarded the delegation of one's responsibility by voting for a parliamentary representative as a dereliction of freedom, the anarchists were little interested in joining or forming political parties aimed at gaining power through elections or even *coups d'état*. For them—and history seems to have proved them right—power was just as corrupting in the hands of a party of left-wing militants as in the hands of a party of right-wing reactionaries; the anarchists sought the destruction, not the appropriation, of the state. But trade unions—or *syndicats*—were another matter, since they retained a direct link with the elemental process of work. Working-class anarchists entered the French *syndicats* in large numbers, established themselves in key positions, and out of their experience developed the only kind of anarchism that attracted a relatively stable mass following.

This was anarcho-syndicalism, or revolutionary syndicalism. The basic theory of anarcho-syndicalism was that the trade union, provided it remained in the hands of the workers and never developed a bureaucracy of permanent union officials, was the ideal instrument for attaining a free society, since industry was the real heart of any state, and the ability to withdraw their labour power would enable the workers to stop that heart beating. They had only

to declare the general strike—the “strike of folded arms” as the French militants called it—for the state to grind to a halt, and then it would be a simple matter for the workers to take over their factories through the *syndicats* and place their products at society's disposal.

Theoretical syndicalists like Georges Sorel, author of *Reflections on Violence*, treated the general strike as a necessary myth for sustaining the militancy of the workers and hence the vitality of society in general. But the anarchist militants within the *syndicats* took the idea literally, and so did those anarchists, notably Malatesta, who remained attached to the spontaneist and localist doctrines of anarchist-communism, and who feared that the domination of the movement by the *syndicats* would lead to the creation of monolithic interest groups that would dominate society economically if not politically.

Nevertheless, it was through the anarcho-syndicalist unions that, in the early twentieth century and especially in France, Spain, Italy and Latin America, anarchism became a powerful mass movement and once again a rival of Marxism. Until after the First World War, the powerful French trade union movement, the CGT, was anarchist-dominated, and so, until Franco's triumph in 1939, was the CNT in Spain, which boasted two million members and was the largest organisation ever to admit to being anarchist. Not only were the anarcho-syndicalists more numerous in Spain than elsewhere; it was in Spain also that they were able to prove, in the first phases of the Civil War of 1936–9, that anarchist theories of workers' direct control of industry could actually work in practice, for the factories and transport systems in Barcelona as well as many agricultural estates in Andalusia and Valencia were taken over by workers under the lead of anarchist militants and—as unbiased outside observers bore witness—were run remarkably well.

But those early months of the Spanish Civil War represented the swan-song of historic anarchism. Already the considerable movements in Russia and Italy had been crushed by the Bolsheviks and Fascists respectively, the former after a spectacular resistance by anarchist guerillas in the Ukraine under the leadership of Nestor

Makhno. The triumph of the Marxists in the Russian October Revolution of 1917 and the foundation of the Comintern weakened anarchism internationally and especially in France, where the Communists took over the CGT and still control it. In Spain, even before the Civil War ended, the anarchist position had been undermined by their communist rivals, and the spirit of the CNT was so weakened that Franco's troops marched unresisted into Barcelona, which had once been the anarchist Mecca. Anarchism became, in 1939, the ghost of a great movement, sustained by a few refugees in Mexico, Sweden and the English-speaking countries, and, rather surprisingly by English and American poets and artists.

When I wrote *Anarchism* in 1960–1, the movement seemed at its nadir. But even then I pointed to the extraordinary resilience of the anarchist idea, which, because of the very absence of anything resembling a monolithic party or an orthodoxy of doctrine, was capable of reviving in different forms at various times in history. Already it had appeared as the rational dissenting Christianity of Winstanley in the seventeenth century, as a way of life to be attained by reasonable discourse in Godwin's vision, as a saving doctrine for peasants and artisans in Proudhon's mutualism, as the romantic revolutionism of Bakunin and Malatesta and the free decentralist communism of the scientist Kropotkin, as the pacifist communitarianism of Tolstoy and Gandhi, and as the practical organisation of workers' control by the syndicalists. Each form had contributed to the tradition in its time and in its own way. And thus, in the first (1962) edition of *Anarchism*, I pointed out that although the historic movement which Bakunin had founded and which reached its peak in Spain was undoubtedly dead, the anarchist idea was still very much alive and might well appear in new forms.

As I have been able to record in the new postscript to the most recent Penguin edition of *Anarchism* (1974), this has actually happened. During the 1940s and 1950s, anarchism was largely kept alive by libertarian writers, notably, in England, Alex Comfort and Herbert Read, whose *Education through Art* developed the theory of an anarchist form of education through the cultivation of the sensibilities. In



Michael Bakunin 1814-1876.

the 1960s anarchist ideas began to spread once again as a result of the agitations of the Campaign for Nuclear Disarmament and the Committee of 100 in England and of the civil rights campaigns in the United States. A renewed anarchism appeared, appealing to the young by its insistence on such ideas as participatory democracy, workers' control, and decentralisation,

all of which struck at the monolithic establishment which the new generation of radicals regarded as their principal enemy.

What has happened is something quite different from the past, and that of course is in keeping with the mutability of the anarchist tradition. The kind of mass movement at whose head Bakunin challenged Marx in the First International, and which reached its apogee in the Spanish CNT, has not reappeared. What has happened is a wide diffusion of anarchist ideas, largely through the publication of new studies and histories of anarchism and the republication of old texts long out of print, a diffusion that has affected the New Left, the student movement, the ecology movement, and other similar trends of the times. Except for a few dedicated militants, anarchists no longer tend to see the future in terms of conflagratory insurrection that will destroy the state and all the establishments of authority and will immediately usher in the free society. That is now seen mainly as the myth of the movement, the point on the horizon that gives direction to present action. Instead of preparing for an apocalyptic revolution, contemporary anarchists tend to be

concerned far more with trying to create, in society as it is, the infrastructure of a better and freer society. In experimental communes, in free schools, in movements among the underprivileged to gain control of their own destinies, in neighbourhood initiatives that defy authority and promote decentralisation, in struggles for greater workers' control and for union democracy, and often in active support for ecological movements as one way of frustrating the threat by corporate power to man and his environment, they are perhaps moving more surely towards the real transformation of society than their predecessors who by making expectations extreme and demands absolute ensured their own defeat. We may never see the free society of which the anarchists dreamed, but if we do achieve a world that is healthier and cleaner and freer than that we now inhabit, the anarchist idea will have contributed to it, and notably in developing those theories of a decentralised and organically integrated society that Kropotkin most fully set out in *Fields, Factories and Workshops*, the book that Tolstoy and Gandhi and Mumford all read as a seminal work.



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BRAZIL - the way to dusty death

by Peter Bunyard

1974 is World Population Year and in August the United Nations is holding its World Population Conference in Bucharest. One of the focal points of the conference is to be what has been termed "A World Population Plan of Action" in which methods will be agreed upon for curbing population growth until the world population eventually stabilizes itself.

Brazil is one country that has taken very strong exception to the Action Plan. According to the Brazilian representative to the UN Population Commission, not only is there no overpopulation problem in the world, but any action to curb population—is likely to have dangerous and unforeseen consequences. "We have evidence", he said, "that 60 per cent of children born in Brazil in 1971 and 1972, whose relatives have taken modern hormonal or chemical

contraceptives, are either physically or mentally deficient".

Such an extraordinary and wholly unsubstantiated claim obviously reflects an all-out government propaganda campaign against contraception in Brazil. It is vividly clear that the Brazilian government wants Brazil's population to expand for in the words of its representative "there are no Great Powers without a large population".

The Brazilian statement is full of misconceptions and dangerous half-truths. These might not matter if Brazil occupied an insignificant proportion of the earth's total land area and resources. But Brazil is set on its own plan of action, which, if fulfilled, could destroy a very large part of its own environment and lead to unforeseen environmental changes throughout the entire world.

Brazil has a rapidly expanding population of over 90 million, vast tracts of unexplored territory which make it the fifth largest nation in the world, immense as yet 'unquantified natural resources, and a programme for development which must be the envy of any nation that has set its sights on the goal of material prosperity. Indeed, under its ruthlessly proficient military dictatorship Brazil is now expanding its economy at a pace that can have few rivals outside Japan, and unlike Japan, Brazil is not likely to be jarred to a halt by a sudden short-fall in basic raw materials. It can only be a matter of years before Brazil has achieved its goal of transforming itself from a backward plantation colony into an industrialised superpower which is the dominant force in South America.

But 2,000 miles of tropical rain forest—by far the largest remaining forest in the world—lie between Brazil's intentions and their fruition. If the conquest of Amazonia is to be successful not only must the forest be cleared but there must be people ready to take over the open spaces. It is hardly surprising therefore to find the Brazilian government absolutely opposed to the United Nations proposed action plan to population.

The forest is already being cut down at a pace that can have few parallels in human history, with the result that Amazonia is near to being encircled and transected by dirt track highways. Already the link between the eastern seaboard and the Pacific Ocean has practically been achieved. The scheme is for farmers, miners and industrialists to move in, working their way outwards from the roads into the jungle, until the entire area is dominated by man. The government is insisting that some virgin forest remain—at least one fifth of any area that is being cleared. But over such a vast territory who is going to supervise which trees are left standing and how many?

Two kinds of farmers have already moved in. The big capitalist farmer who has cleared the forest and made for himself a huge cattle ranch; and the poor peasant from the drought-ridden north east. The government has promised to transplant some 80,000 peasant families into the jungle but only 5,000 have gone, and many of these are in great difficulty through unrelenting poverty and through

tropical diseases to which they have no resistance. Moreover the peasants have little choice as to where they are put and many have found themselves reaping pitiful harvests from the impoverished soil of Brazil's terra firma.

Foreign investment has been made easy in Brazil, and money is pouring in. The multinationals feel that there are huge bonanzas waiting to be discovered and the entire continent is being explored for minerals. Vast quantities of manganese, tin, bauxite and iron have already been found and the Brazilian government is determined to establish highly competitive manufacturing industries based on these raw materials.

Rapid Expansion

At all costs Brazil wishes to avoid the fate of so many Third World countries which in the past have sold their raw materials cheap to the manufacturing countries and have then bought them back as finished products at highly elevated prices. Over the past decade Brazil's iron ore exports quadrupled to reach 50 million tons a year. But Brazil now wants to get its own steel industry going, and with help from Nippon Steel and possibly the British Steel Corporation another enormous mine is to be opened in the Carajas Mountains near the Amazon Basin. In addition a £1,000 million steelworks is to be constructed on the North Coast; its steel will be strictly for export.

The jungle for most Brazilians is an obstacle to be overcome; a barrier which keeps them from their heritage of riches and holds back economic progress. Nevertheless the Brazilians have become aware that their intention to chop down the forest has given rise to some outspoken criticism from outside. Their response is a mixture of self-justification and indignation. "We have a right to cut the forest down, even if it does mean there'll be less oxygen in the world. Other countries like Britain and the United States have developed themselves and are using up the world's oxygen. Now it's our turn", I was angrily told by a bright young Brazilian woman.

Experts have already poohpooed the idea that industrialisation has led, or could lead to, a significant fall in global oxygen levels, so at first sight the woman's statement about oxygen would appear to be sheer nonsense.

But there is a disturbing element of truth in it. The first question we have to ask is whether the Amazon rain forest produces a net global gain in oxygen which is then absorbed by some other less productive area in the world. According to Howard Odum a tropical rain forest is capable of relatively high photosynthetic efficiencies, with as much as 10 per cent of the incident light being taken up by the vegetation. The net result of this relatively high rate of photosynthesis must be a high rate of growth, which in fact occurs. But growth is an energy-consuming process and therefore a higher net increase in oxygen production is countered by an equally high increase in oxygen use. The two processes are therefore likely to balance each other out. In the end growth gives way to death and decay and these are also processes requiring oxygen. In addition the tropical ecosystem contains a complete spectrum of animals which eat vegetation and eat each other. On biological grounds it would therefore seem most unlikely that there would

If all the protective vegetation were removed from the humid Tropics "the earth's atmosphere would soon be denuded of oxygen."

be any significant net gain in global oxygen derived from the Amazon rain forest.

So what if one cleared the Amazon of vegetation, leaving large areas as empty of life as a bare mountain? One could argue that so long as there were no fossil fuel consuming industries nor any great animal activity such cleared areas would have no impact at all on the global oxygen levels. And even if there were industries releasing such gases as carbon dioxide into the atmosphere it need not necessarily matter; for there is evidence that the higher the concentrations of carbon dioxide in the air, the greater the rate of photosynthesis. The result then would be a greater production of oxygen from areas which remained covered in vegetation.

But there are some extremely disturbing arguments as to why a wholesale chopping down of the Amazon forests would be totally disastrous. Undoubtedly the world's climate would change and it is possible that instead of being an area of high rainfall the

entire Amazon Basin would begin to dry out. One indication that this change is likely is found in North East Brazil which was once an area of tropical rain forest but is now a drought ridden disaster zone.

The most convincing reason of all why it would be foolhardy to destroy the tree cover in the Amazon comes from work by Dr Mary McNeil. Her speciality is lateritic soils which are largely found throughout the humid tropics including the Amazon basin. These soils are rich in iron, manganese tin and aluminium and in time, as air gets to these minerals they are oxidized into hard brick-like substances which form an unworkable hardpan over the surface. Although soil laterization is going on all the time—and in the tropics the process proceeds more quickly because of the high temperatures—it is in fact checked by vegetation and particularly by tree cover.

Just what happens when tree cover is removed has been vividly related by Dr McNeil herself. "At Iata, an equatorial wonderland in the heart of the Amazon basin, the Brazilian government set up an agricultural colony. Earthmoving machinery wrenched a clearing from the forest and crops were planted. From the very beginning there were ominous signs of the presence of laterite. Blocks of ironstone stood out on the surface in some places; in others nodules of the laterite lay just below a thin layer of soil. What had appeared to be rich soil, with a promising cover of humus disintegrated after the first or second planting. Under the equatorial sun the iron-rich soil began to bake into brick. In less than five years the cleared fields became virtually pavements of rock. Today Iata is a drab despairing colony that testifies eloquently to the formidable problem laterite presents throughout the tropics."

Oxygen Problem

An isolated incident of soil laterization may not seem particularly important but it does illustrate what would probably happen to large areas of the Amazon basin should the tree cover be removed. In addition, laterization uses up considerable quantities of oxygen. According to McNeil, if all the protective vegetation were removed from the humid Tropics "the earth's atmosphere would soon be denuded of oxygen". If she is right then the whole-

sale cutting down of the Amazon forest would be bound to cause a substantial drop in global oxygen levels.

Not only are the Amazon soils lateritic but most of them are very low in fertility. Nevertheless the forest is extremely luxuriant, with an incomparably varied flora, and many people have been misled into believing that the world's food problems could be solved at a stroke by turning the Amazon and other tropical rain forests over to modern methods of "intensive" monoculture cultivation. But in reality the forest's luxuriance is little more than an extraordinary facade which crumbles into nothing once the tree canopy has gone. This canopy provides shade and keeps the soil temperature down so that humus breakdown does not exceed accumulation. The all important soil nutrients are thus held in the soil rather than being washed away in the heavy tropical rains. The trees are also remarkable retrieval systems, taking up nutrients together with large quantities of water—a fact which undoubtedly helps to break the impact of the rains, and diminishes erosion.

The dismal failure at Iata is all too typical, and it appears that the intensive cultivation of permanent fields cannot succeed in a tropical rain forest. Yet Brazilian agronomists and indeed experts from FAO still believe it possible to establish such an agricultural system in Amazonia primarily because they want to develop large settlements of population. The terrible irony is that the indigenous tribes, who are the only people to have developed a satisfactory and long lasting system of agriculture in the Amazon, are fast having to abandon their way of life—that is if they survive at all—in the face of the white man's ruthless advance into the jungle. Because the Indians are still virtually in the stone-age many agronomists sneer at their slash-and-burn or shifting cultivation. But not only is shifting cultivation the sole method of agriculture which appears to leave the forest undamaged over any length of time, it can also be as productive, if not more so, than a conventional agricultural system based on permanent fields.

Evidence of the productivity of shifting cultivation is now coming from many different parts of the world. Oscar Lewis, for example, has shown that swidden farmers in Tepotzlan in

Mexico, obtain yields of maize which are twice those from continuously cropped lands, and that in spite of the fact that these "extensive" farmers tend to be pushed out onto marginal land. According to Harold Conklin rice production per man-hour from the Hanunoo rice swiddens in the Philippines "compares favourably with labour cost figures for rice production under the best conditions elsewhere in the tropics". In the New Guinea highlands Professor Roy Rappaport has shown that the stone-age Tsembaga get good returns in terms of man-hour production. Thus for every calorie of energy they expend in clearing the forest, planting it and tending their crops, they get 16 calories back in their food. The excess is fed to pigs. Moreover they have developed a system to prevent any site being used for more than a couple of years at a stretch. In the tropical rain forest

A swidden farming group of low average efficiency in tropical South America should be able to support nearly five hundred people in a single sedentary settlement.

weeds grow rapidly and the Tsembaga therefore spend a considerable amount of time in their gardens keeping their crops—always a polyculture—free from weeds. But the most formidable weeds of all, the young tree saplings, are left untouched and after two year's growth they have become so big as to make further cultivation of the plot impossible. The plot is then abandoned for a new clearing. The tree saplings are called "duk mi"—the mother of gardens.

It has been claimed that slash-and-burn methods of cultivation can support only a small number of people in any one area. According to E. R. Wolfe "slash-and-burn cultivation usually implies a scattered population, a population unwilling to pay homage to a centre of control". Such a system of cultivation, says Wolfe, "could not provide a stable economic basis for the growth and existence of Maya civilization." It is hard to see how Wolfe could come to that conclusion when the evidence suggests that shifting cultivation was probably the only kind in existence in that part of Meso-America when the Maya civilization came into being. R. L. Carneiro for example has calculated that a swidden

farming group of low average efficiency in tropical South America should be able to support nearly five hundred people in a single sedentary settlement, and that the Kuikuru of the Upper Xingu region of Brazil could support a farming population of two thousand people in a single sedentary village. It is also well known that many of the large settlements found in West Africa at the time of the first European contact were maintained by swidden agriculture. In the 1850s, at least nine settlements in what today is Nigeria had populations of between 20 and 70 thousand with craft specialization and social stratification. These settlements were supported by slash-and-burn agriculture.

The Amerindians aside, Brazil has none of the traditions of West Africa and in one generation is determined to shake itself free of anything that seems outmoded and laborious in its attempt to make itself into a powerful respected nation. To the Brazilians the Indians in the Amazon represent more than just backward, archaic man, they represent nature, and nature is something execrably gross and inefficient, to be banished from the earth as soon as man can bring his dazzling knowledge and technological ingenuity to bear upon the problem. For example, the Brazilian government cannot with equanimity contemplate all the energy pouring each day upon the earth and being used so unproductively by nature.

No limits to growth

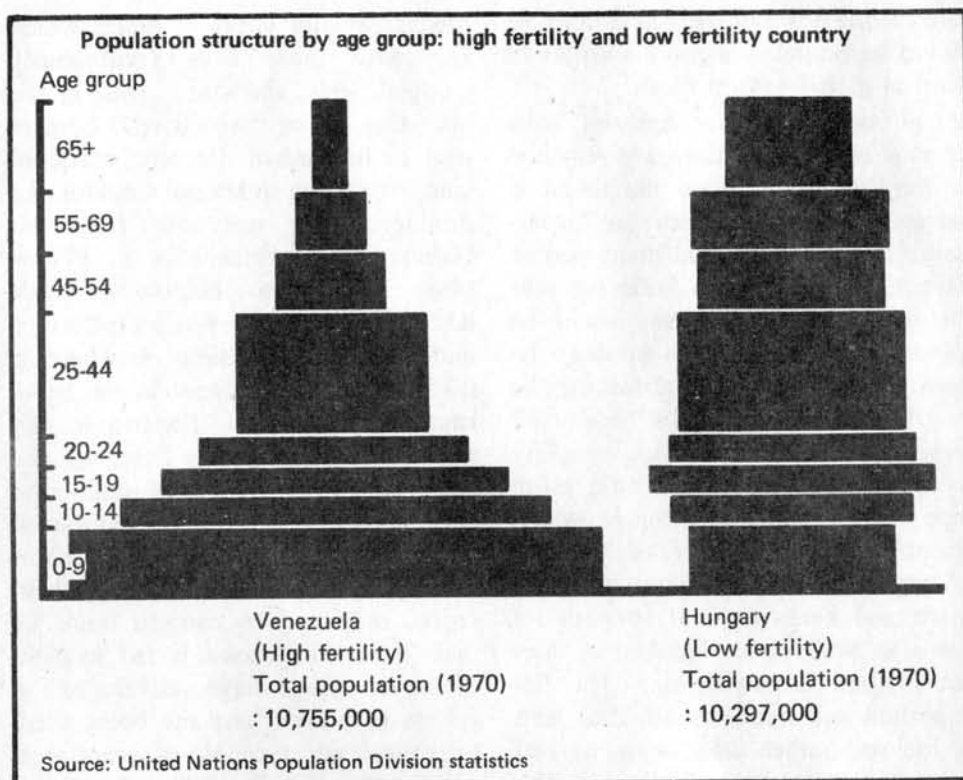
In the words of the Brazilian representative to the UN Population Commission: "The sun throws upon the earth's surface an amount of energy equivalent to about 40,000 times the consumption of energy by man in 1973. This energy is today absorbed, in part, through the little understood, but inefficient method of vegetal photosynthesis, both on land and in water. A fantastic amount of it is wasted, but it is a fair guess that a good deal will eventually be harnessed directly by man-made receptors... With unlimited energy and within the evolving cost structures of new mining and recycling of waste resources, including of ocean water, the limits to growth, be it economic or demographic growth, will be shattered out of existence..."

Perhaps the Brazilian representative has forgotten that nearly one-third of

the sun's energy to the earth dissipates in working the planet; a very necessary function if life is to exist. As for photosynthesis—far from being “poorly understood” it has been analysed in detail. Moreover to think of it as “inefficient” when it is capable of supporting such a veritable galaxy of living organisms and is in fact the only life-support system of man, would be nothing more than foolish if the Brazilian government did not intend to use it as justification for getting rid of the Amazon forest. In that context it is nothing more or less than a recipe for disaster.

There can be no doubt that Brazil has an embarrassing demographic problem. Its population is growing at the rate of 2.9 per cent each year, and despite its incredible economic boom Brazil is still a place of excruciating poverty and of enormous shanty town slums. According to ILO the slum and squatter settlements of all Brazilian cities with more than 100,000 inhabitants are expected to multiply six times in the next 12 years. Admittedly the military dictatorship, which took over 10 years ago, did not create the problems of Brazil and in particular the yawning gulf between the rich and poor. But despite the fantastic fall in inflation from a peak rate of 100 per cent in 1964 to its present level of around 16 per cent and despite the enormous foreign investments the poor are relatively as bad off as they ever were. In 1960 the 10 per cent poorest of the population took 1.17 per cent of the total income. Ten years later the percentage taken by this sector of the population had fallen to 1.11 per cent. The 10 per cent richest in the meantime had increased their share of Brazil's income from 39.66 per cent in 1960 to 47.79 per cent 10 years later. Thus while one man in Sao Paulo may earn as much as £100,000 per year, another, also in full employment as a labourer may earn no more than £300.

A man at the top end of the income spectrum can afford inflation; a worker at the bottom cannot. Moreover by putting the emphasis on exports the government has made life very hard for the working classes who are having to pay inflated prices for basic commodities. Thus one government policy caused land to be taken over for the production of soya beans for export. That land had previously been used for the production of ordinary beans



which provided basic protein for the working classes. As a result the price of ordinary beans more than doubled—a great burden for people who have to spend more than 40 per cent of their incomes on food.

The present regime in Brazil is aware of these problems, but the belief is that they can be solved only by pushing remorselessly ahead with economic growth. In its headlong pursuit of that growth the Brazilian government has underway a great many gigantic construction schemes and has reached a point where there is a shortage of skilled labour. The answer to this shortage in the government's eyes is simple, a bigger population.

To justify this desire for a greatly expanded working population the Brazilian representative has come up with some interesting calculations which are as meaningful as those relating to the numbers of Englishmen that can stand side by side and back to back on the Isle of Wight.

An Underpopulated World

“The Brazilian amazonic area alone, with three and a half million square kilometres and less than one person per square kilometre, could take a lot more people than presently there. If we had the demographic density of the Federal Republic of Germany or of the Netherlands, Brazil would be respectively 2,052 million and 3,082 million people instead of 100 million. If we

had the density of the state of Sao Paulo, our most productive provincial unit in industry, agriculture and services, we would have 630 million people”, he said. “The truth is that the problem of geographical space for man's physical support is not at all a problem at this juncture or in the foreseeable future”.

The Brazilian representative has overlooked a number of important facts. First and foremost he has forgotten that the population of the Netherlands, or of Britain for that matter was only able to expand to its present size because it had an outlet in its colonies. Even though the colonies have vanished the same basis of trade exists. Food for example is imported in enormous quantities at very cheap prices, as are other raw materials, such as phosphate for fertiliser. In *World Food Resources* Professor Georg Borgstrom points out that both the Dutch and British depend on large acreages of land abroad in order to feed themselves. According to Borgstrom, the Dutch need more than four times as much land for agricultural purposes as they have at home and the British nearly three times.

These imports of food might not matter if the world were presently able to feed itself satisfactorily. Even in Brazil despite its enormous land area, people are still suffering from malnutrition, and the situation is now appalling for many Asians and Africans.

The Brazilian delegate also seems to have overlooked the difference in structure between his country's population and that of a European country such as Britain. Even though the population density may be high in Europe the rate of growth of the population has never at any time reached the levels found today in many Third World countries, including Brazil. This slower growth rate in Europe has meant that the population was better balanced in the sense that no one age group predominated. In countries such as Brazil the under 15s predominate and they now make up more than 40 per cent of the total population. And what happens when the under 15s grow up and have children of their own? Will the percentage of the under 15s increase still further, especially in countries such as Brazil which appear to have no intention of trying to curb population growth?

In its report *Population and Labour* ILO points out that "between 1970 and 1985—a mere 15 years—the world total of children under the age of 15 is expected to increase by nearly 450 million, 400 million of whom will be in the Third World". By 1980 two-thirds of these children will have reached the age when they should be at school, if that age is assumed to be five years. "If they were to have educational opportunities equal to those of children in more fortunate lands, their governments would, within 10 years, have to build, equip and train teachers for as many schools as now exist in the whole of Europe, the Soviet Union, the United States, Canada, Australia and New Zealand combined".

In the light of ILO's statistics the Brazilian's glib assertion that there are no foreseeable limits to growth is hardly worth an answer. But there is also another point that the Brazilians should bear in mind. As the population grows so the number of basic services has to increase; indeed new schools, hospitals, farms, workshops all have to be provided to satisfy demand. It has been calculated that a one per cent growth in population will absorb something like 4 per cent of the total national income just in order that these demographic demands be met. With its 2.9 per cent rate of growth Brazil will therefore have to expend nearly 12 per cent of its national income just to stand still.

Although it would be hard to take

the Brazilian seriously when he claimed the extraordinarily high disabilities arising in children whose parents had taken chemical contraceptives, his concern at the widespread use of such contraceptives may be justifiable. In fact there is very little evidence that the use of chemical contraceptives is or has ever been a major factor in reducing the fertility of a population. In Britain for example fertility dropped to its lowest point since the industrial revolution began in the 1920s and 1930s when chemical contraceptives did not exist in Europe and there were no such devices as IUDs.

If there are increasing numbers of deficient children being born in Brazil the causes could be much more subtle than teratogenic effects arising from contraceptive use. Indeed stress through overcrowding, poverty, ill-health and malnutrition might be a more important factor. A number of different authorities, Professor McKeown in Britain for example, have shown that the number of malformations such as spina bifida and anencephaly increase during specific periods of social stress. Thus there was a distinct peak in the malformation rate recorded in Birmingham during the years 1940-43 when the bombing was at its worst.

Stress and Abnormality

In a study of 102 mentally sub-normal children Dr D H Stott found that their mother's pregnancy was much more commonly disturbed by illness or emotional upsets than was the mother's pregnancy of normal children. Many animal behaviourists have made similar findings among animals which are subjected to stress, and Stott suggests that the high rate of malformations and falling fertility among animals as well as humans may well be a natural mechanism for preventing excessive population growth. At what level a human population feels itself to be under stress will obviously vary according to the environmental conditions. A number of Amerindian tribes have practically stopped breeding in response to contact with western civilisation. One Brazilian tribe had only produced two children over a five-year period despite there being a number of eligible parents.

Almost without exception the tribes living in the Amazon have devised cultural controls for limiting their populations to levels well below the

carrying capacity of the environment. These methods of population control, which include infanticide, an extended period of lactation with taboos on sexual intercourse and even the occasional murder of related tribesmen from neighbouring villages as practised by the Jivaros of Ecuador, appear to be highly effective and are the hallmark of an incredible adaptation to environmental conditions in the rain-forest. To us they may seem savage and barbaric, but what can be more barbarous than subjecting man in his millions to the unspeakable squalor of a shanty town slum?

Ironically by destroying the way of life of the Indian, the Brazilian government is losing the opportunity to learn how best to use its heritage of tropical rain forest. There is undoubtedly more room for people in the jungle, but rather than force the environment to adapt to them, they should learn to adapt, as the Indians have done, to their environment; for in forcing their environment to adapt to them they will inevitably and irrevocably destroy it.

It is perhaps too much to ask of the Brazilians to abandon their schemes for cutting down the forest and for wresting its riches from it. The big question is whether such actions will put Brazil in the league of powerful nations. Brazil sees the world's markets at its feet and envisages itself to be in an enviable position of both producer of raw materials and manufacturer. But will the rest of the world be able to afford its prices? The world is now in crisis and the long term future of the industrial society is in jeopardy. What if the energy which the Brazilians claim to be ready for the taking is not forthcoming, what good their steel then or their laterized soils?

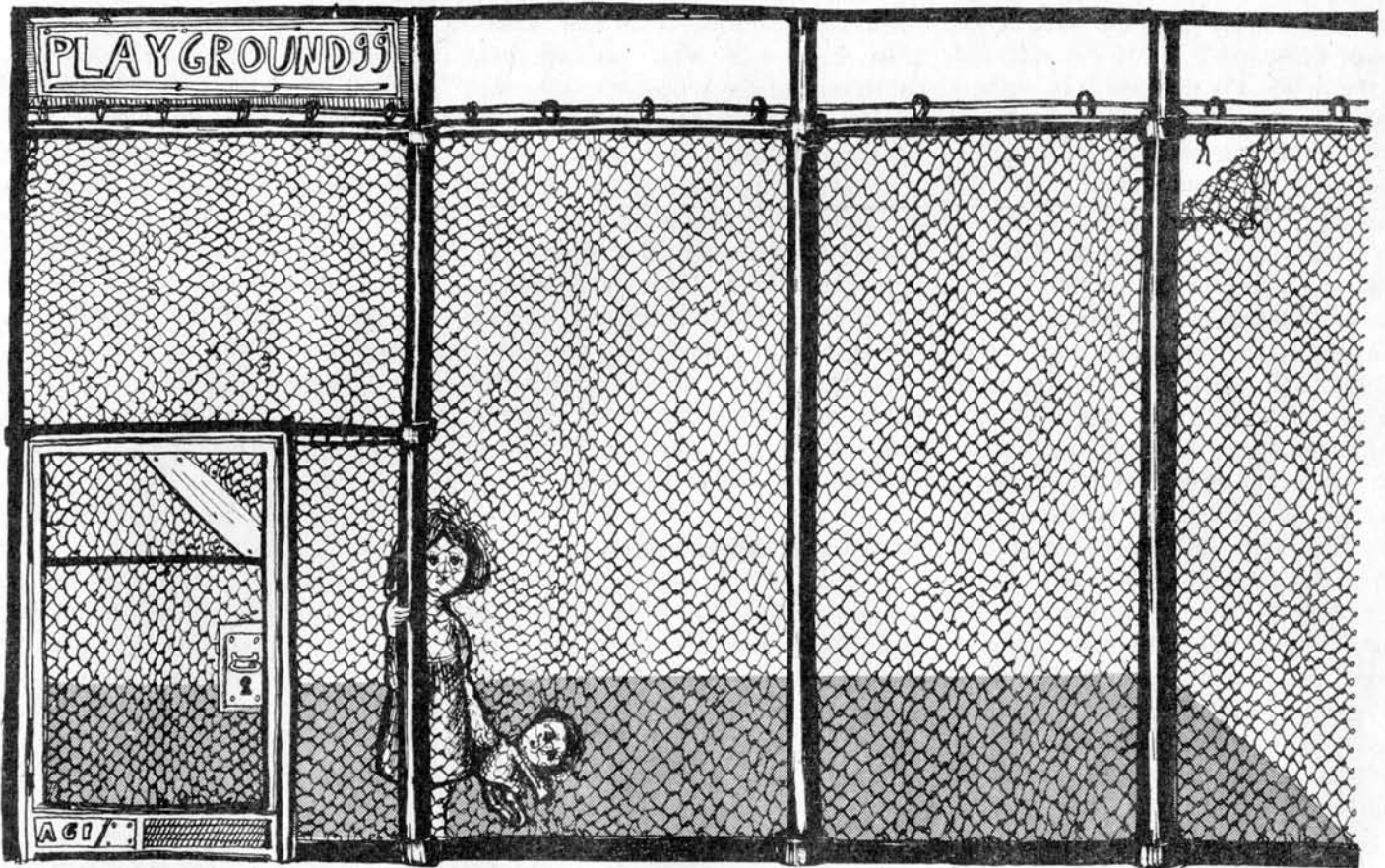
* In fact the Brazilians can hardly be blamed for embarking on a way of life which has already been pursued with equal avidity and ruthlessness by the industrialised nations of the world. Nor can they be blamed for thinking that the UN Plan of Action on Population is threatening their own right of sovereignty, especially when this plan is so heavily promoted by the industrialised nations. But they should take care to avoid the trap of thinking that industrialisation will solve their problems when instead it is just adding to them and willy nilly to those of the rest of the world.

THE UNMAKING OF THE AMERICAN CHILD

Dwindling contact between parents and their children, lack of care, affection and discipline, combined with the extraordinary intrusion of television into the average household are having disastrous effects on the up and coming generations in the western world. According to social psychologist Urie Bronfenbrenner permissiveness is just another word for parents who have neither time nor inclination to look after their children.

There is only one country worse than the United States in parental care and that is Britain. No wonder the UK's juvenile delinquency rate is so spectacularly high compared to other European countries. In this article taken from Bronfenbrenner's book *Two Worlds of Childhood* — USA and USSR the author makes it clear that the family must be re-instituted and parents must re-establish care and responsibility for their children if there is not to be a complete social breakdown in the future.

by Urie Bronfenbrenner



Particularly since World War II, many changes have occurred in patterns of child rearing in the United States, but their essence may be conveyed in a single sentence: Children used to be brought up by their parents.

It may seem presumptuous to put that statement in the past tense. Yet it does belong to the past. Over the years, de facto responsibility for upbringing has shifted away from the family to other settings in the society, some of which do not recognise or accept the task. While the family still has the primary moral and legal responsibility for the character development of child-

ren, it often lacks the power or opportunity to do the job, primarily because parents and children no longer spend enough time together in those situations in which such training is possible. This is not because parents do not want to spend time with their children. It is simply that conditions have changed.

An Outmoded Past

To begin with, families used to be bigger—not in terms of more children so much as more adults—grandparents, uncles, aunts, cousins. Those relatives who did not live with you lived nearby. You often went to their house. They

came as often to yours, and stayed for dinner. You knew them all, the old folks, the middle-aged, the older cousins. And they knew you. This had its good side and its bad side.

Child Rearing in America

On the good side, some of these relatives were interesting people, or so you thought at the time.

But there was the other side. You had to give them all Christmas presents. Besides, everybody minded your business. They wanted to know where you had been, where you were going, and why. And if they did not like what they

heard, they said so.

And it wasn't just your relatives. Everybody in the neighbourhood minded your business. Again this had its two aspects.

If you walked on the railroad trestle, the phone would ring at your house, and your parents would know what you had done before you got back home. People on the street would tell you to button your jacket, and ask why you were not in church last Sunday. Sometimes, you liked it and sometimes you didn't—but at least people cared.

You also had the run of the neighbourhood. You were allowed to play in the park. You could go into any store, whether you bought anything or not.

Boyhood memories to be sure. But they still have their present-day vestiges, documented systematically in the research of Professor Herbert Wright and his associates at the University of Kansas! These investigators compared the daily life of children growing up in a small community with those living in larger towns. The principal difference: unlike their urban and suburban age-mates, children in a small town become well acquainted with a substantially greater number of adults in different walks of life, and are more likely to be active participants in the adult settings which they enter.

The Split Society

As the stable world of the small town has become absorbed into an ever-shifting suburbia, children are growing up in a different kind of environment. Urbanisation has reduced the extended family to a nuclear one with only two adults, and the functioning neighbourhood—where it has not decayed into an urban or rural slum—has withered to a small circle of friends, most of them accessible only by car or telephone. Paradoxically, the more people there are around, the fewer the opportunities for meaningful human contact. Whereas, before, the world in which the child lived consisted of a diversity of people in a diversity of settings, now for millions of American children the neighbourhood is nothing but row upon row of buildings where "other people" live. One house, or apartment, is much like another—and so are the people. They all have more or less the same income, and the same way of life. But the child does not see much of that life, for all that people do in the neighbourhood is

to come home to it, have a drink, eat dinner, mow the lawn, watch television, and sleep. Increasingly often, today's housing projects have no stores, no shops, no services, no adults at work or play. This is the sterile world in which many of our children grow, and this is the "urban renewal" we offer to the families we would rescue from the slums.

Nowadays, neighbourhood experiences available to children are extremely limited. To do anything at all—go to a movie, get an ice cream cone, go swimming, or play ball—one has to travel by car or bus. Rarely can a child see people working at their trades. Mechanics, tailors, or shopkeepers are either out of sight or unapproachable. Nor can a child listen to the gossip at the post office or on a park bench. And there are no abandoned houses, or barns, no attics to break into. It is a pretty bland world.

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It does not really matter, however, for children are not at home much either. They leave early on the school bus, and it is almost supper time when they get back. And there may not be anybody home when they get there. If their mother is not working, at least part-time, (and over a third of American mothers are), she is out a lot because of social obligations—not just to be with friends, but to do things for the community. The men leave in the morning before the children are up. And they do not get back until after the children have eaten supper. Fathers are often away weekends, as well as during the week.

All of this means that American parents do not spend as much time with children as they used to. Systematic evidence consistent with this conclusion comes from a survey by the author of changes in child-rearing practices in the United States over a 25 year period. As a basis for the analysis, data were used from some 30 studies carried out during this interval by a variety of investigators. In the original publication,

the data were interpreted as indicating a trend towards universal permissiveness in parent-child relations, especially in the period after World War II. "The generalisation applies in such diverse areas as oral behaviour, toilet accidents, dependency, sex, aggressiveness, and freedom of movement outside the house."

With the benefit of hindsight, the original author now recognises that these same data admit of another interpretation, consistent with the trend toward permissiveness, but going beyond it; namely, the same facts could be viewed as reflecting a progressive decrease, especially in recent decades, in the amount of contact between American parents and their children.

The same conclusion is indicated by data from another perspective—that of cross-cultural research. In a comparative study of parental behaviour in the United States and West Germany, Devereux, Bronfenbrenner, and George J. Suci found, somewhat to their surprise, that German parents not only disciplined their children more but were also more affectionate, offered more help, engaged in more joint activities, etc. The differences were especially marked in the case of father with "Dad" perceived as appreciably less of a "pal" to his kids than "Vati" to his "Kinder".

Emotional Ties

But even if Americans have to yield place to Germans in the matter of parental involvement, how do they stand in comparison to Russians? Specifically, given the prevalence of institutional upbringing in the U.S.S.R., one might conclude that American parents are closer to their children than their Russian counter parts. Paradoxically, although as yet we have no systematic data on this point, our field observations fail to support such a conclusion. Collective upbringing notwithstanding, emotional ties between Russian parents and children are, as we have seen, exceptionally strong. Maternal over-protection, overt display of physical affection, and simple companionship between parents and children appear more pronounced in Soviet society than in our own. Although, because of longer working hours and time lost in shopping and commuting, Soviet parents may spend less time at home, more of that time appears to be spent in conversation, play, and companion-

ship with children than in American families.

In summary, whether in comparison to other contemporary cultures, or to itself over time. American society emerges as one that gives decreasing prominence to the family as a socialising agent. This development does not imply any decrease in the affection or concern of parents for their children. Nor is it a change that we have planned or wanted. Rather it is itself the by-product of a variety of social changes, all operating to decrease the prominence and power of the family in the lives of children. Urbanisation, child labour laws, the abolishment of the apprentice system, commuting, centralised schools, zoning ordinances, the working mother, the experts' advice to be permissive, the seductive power of television for keeping children occupied, the delegation and professionalisation of child care—all of these manifestations of progress have operated to decrease opportunity for contact between children and parents, or, for that matter, adults in general.

If a child is not with his parents or other adults, where does he spend his time? There are two answers to this question. First and foremost, he is with other children—in school, after school, over week-ends, and on holidays. But even this contact is further restricted. The passing of the neighbourhood school in favour of "educational advantages", made possible by consolidation, homogeneous grouping by age—and more recently by ability—has set the pattern for other activities so that from preschool days onwards a child's contacts with other children in school, camp, and neighbourhood tend to be limited to youngsters of his own age and social background. Whereas invitations used to be extended to entire families, with all the Smiths visiting all the Joneses, nowadays, every social event has its segregated equivalent for every age group down to the toddlers. The children's hour has become the cocktail hour. While the adults take their drinks upstairs, the children have their "juice time" in the rumpus room downstairs.

As the foregoing example indicates, the segregation is not confined to the young. Increasingly often, housing projects, or even entire neighbourhoods cater to families at a particular stage of life cycle or career line, and social life becomes organised on a similar

basis, with the result that, at all levels, contacts become limited to persons of one's own age and station. In short, we are coming to live in a society that is segregated not only by race and class but also by age. The peer-oriented child is more a product of parental disregard than of the attractiveness of the peer group—that he turns to his age-mates less by choice than by default. The vacuum left by the withdrawal of parents and adults from the lives of children is filled with an undesired—and possibly undesirable—substitute of an age-segregated peer group.

Children and Television

But there is a second context in which American children spend much of their time. And again they are propelled there in part by parental example and parental pressure. They watch television.

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Television was introduced into American homes in the early 1950s, and its growth has been prodigious. The proportion of families owning television sets rose from almost none in 1950 to 90 per cent by 1960, according to Leo Bogart. Our understanding of the impact of this powerful medium, however, has lagged far behind its commercial success. The average viewing time for children between the ages of six to 16 is 22 hours per week in America, in Lotte Bailyn's study, and this compares with the approximately 14 hours a week for children in Britain established by Hilde Himmelweit, A. N. Oppenheim, and Pamela Vince. Thus the American child spends about as much time watching television as he spends in school, and more than in any other activity except sleep and play. Younger children tend to watch more than older children, although the difference is not great.

In a study reported by Paul A. Witty and his colleagues the averages ranged from 17 hours per week for second grade, up to 28 hours a week for sixth grade. In addition, children of higher levels of social class or IQ tend to watch more television than those of lesser ability or lower social status.

By the time the average child is 16 he has watched from 12,000 to 15,000 hours of television. In other words, he has spent the equivalent of 15 to 20 solid months, 24 hours a day, before a television screen. Accordingly, it behoves us to know of the potential effects of this powerful and omnipresent source of influence. It would be wrong to assume, from the out-set, that all the effects of television are necessarily bad—or good. But it could be folly to ignore the possible effects and to allow this massive intrusion into the daily lives of children without at least questioning its impact. Indeed, the relevant question was posed many centuries ago by Plato.

"And shall we just carelessly allow children to hear any casual tales which may be devised by casual persons, and to receive in their minds ideas for the most part the very opposite of those which we should wish them to have been when they are grown-up?"

The Impact of Peers

The prevailing view in American society—indeed, in the West generally—has held that the child's psychological development, to the extent that it is susceptible to environmental influence, is determined almost entirely by his parents, and within the first six years of life at that. And scientific investigators—who are, of course, also products of their own culture, imbued with its tacit assumptions about human nature—have acted accordingly. Western studies of influences on personality development in childhood overwhelmingly take the form of research on parent-child relations, with the peer group, or other extra-parental influences, scarcely being considered.

In other cultures, this is not always so. A few years ago, at the International Congress of Psychology held in Moscow, the author was privileged to chair a symposium on "Social Factors in Personality Development". Of the score of papers presented at the symposium, about half were from the West (mostly American) and half were from the socialist countries (mostly Russian). Virtually without exception the Western reports dealt with parent-child relationships, while those from the Soviet Union and other East European countries focused equally exclusively on the peer group, that is, the children's collective.

Some relevant studies have been carried out in our own society. To begin with, we can learn something from investigations of the effects of parental absence. For example, in a study by Bronfenbrenner of American adolescents from middle-class families, it was found that children who reported that their parents were away from home for long periods of time rated significantly lower on such characteristics as responsibility and leadership. Perhaps because it was more pronounced, absence of the father was more critical than that of the mother, particularly in its effect on boys. Similar results have been reported in studies of the effects of father absence among soldiers' families during World War II, in homes of Norwegian sailors and whalers, and households with missing fathers both in the West Indies and the United States. In general, father absence contributes to low motivation for achievement, inability to defer immediate rewards for later benefits, low self-esteem, susceptibility to group influence (e.g. children with absent fathers are more likely to "go along with the gang"), and juvenile delinquency. All of these effects are much more marked for boys than for girls.

The fact that father's absence increases the child's susceptibility to group influence leads us directly to consideration of the impact of the peer group on children's attitudes and behaviours.

Two investigations in the 1950s indicated that, in the age range studies (12 to 18 years), although both sources were influential, the peer group tended to outweigh parents in influencing children's values and acts. A broader perspective is provided by the first (and as yet the only) comprehensive research on this question carried out by two sociologists, Charles E. Bowerman and John W. Kinch, in 1959. "Working with a sample of several hundred students from the fourth to the tenth grades in the Seattle school system, these investigators studied age trends in the tendency of children to turn to parents or to peers for opinion, advice, or company in various activities. In general, there was a turning point at about the seventh grade. Before that, the majority looked mainly to their parents as models, companions, and guides to behaviour; thereafter, the children's peers had equal or greater influence.

Recently, Condry and Siman com-

pleted a study designed to reveal current trends in the reliance of children on parents versus peers as sources of information and opinion. The results show a substantially greater percentage of peer "dependence" at every age and grade level than did Bowerman's and Kinch's study. It would appear that the shift from parents to peers as the child's major source of information occurs at an earlier time than it did a decade ago and is now much more pronounced.

By the time the average child is 16 he has watched from 12,000 to 15,000 hours of television. In other words, he has spent the equivalent of 15 to 20 solid months, 24 hours a day, before a television screen.

In the early 1960s, the power of the peer group was documented even more dramatically by James S. Coleman in *The Adolescent Society*. Coleman investigated the values and behaviour of teenagers in eight large American high schools. He reported that the aspirations and actions of American adolescents were primarily determined by the "leading crowd" in the school society. For boys in this leading crowd, the hallmark of success was glory in athletics, for girls, the popular date. Intellectual achievement was, at best, a secondary value. The most intellectually able students were not those getting the best grades. The classroom was not where the action was. The students who did well were "not really those of highest intelligence, but only the ones who were willing to work hard at a relatively unrewarded activity".

The most comprehensive study relevant to these concerns was a survey, also directed by Coleman, of factors affecting educational achievements in the nation's school. The data were obtained from over 600,000 children in grades one to 12 in 4,000 schools carefully selected to be representative of public education in the United States. An attempt was made to assess the relative contribution to the child's intellectual development (as measured by standardised intelligence and achievement tests) of the following factors.

Family background (e.g. parents' education, family size, presence in the

home of reading materials records).

School characteristics (e.g. per pupil expenditure, classroom size, laboratory and library facilities).

Teacher characteristics (e.g. background, training, years of experience, verbal skills).

Characteristics of other children in the same school (e.g. their background, academic achievement, career plans).

Of the many findings of the study two were particularly impressive, the first entirely expected, the second somewhat surprising. The expected finding was that home background was the most important factor in determining how well the child did at school more important than any or all aspects of the school which the child attended. This generalisation, while especially true for Northern whites, applied to a lesser degree to Southern whites, and Northern Negroes, and was actually reversed for Southern Negroes, for whom characteristics of the school were more important than those of the home. It is as if the child drew sustenance from wherever it was available. When the home had more to offer it became more determining; but when the school could provide more stimulation than the home, then the school became the more influential factor.

The Unmaking of the American Child

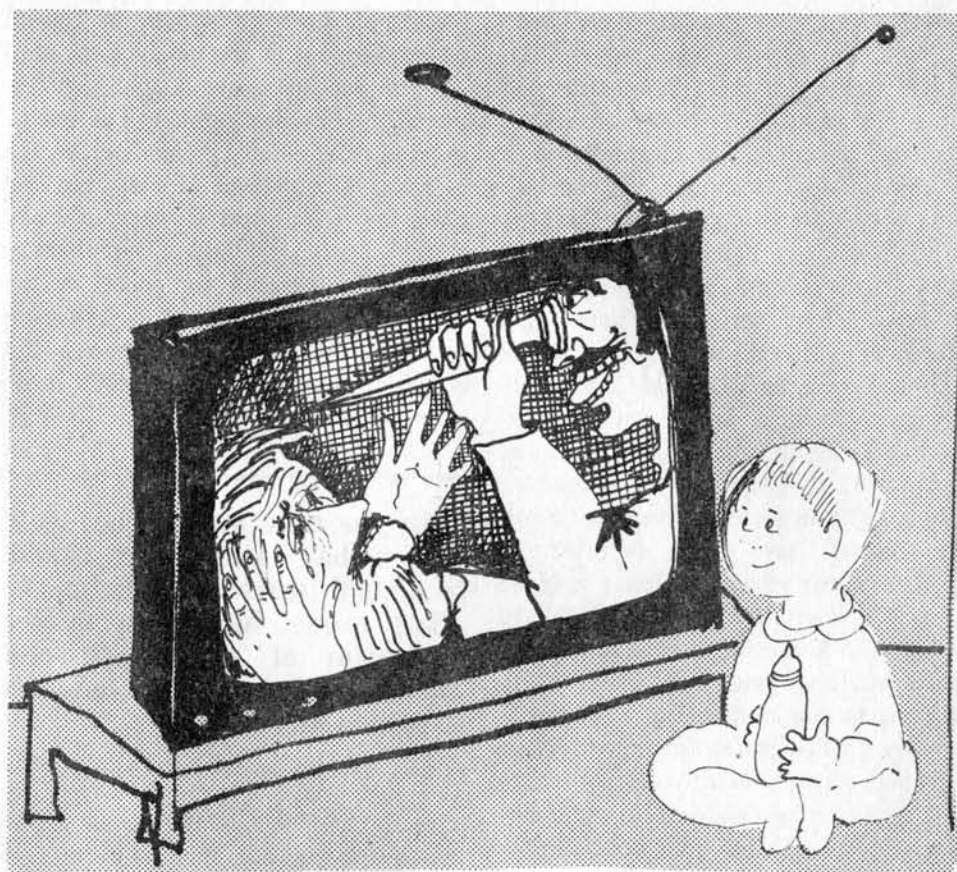
The second conclusion concerned the aspects of the school environment which contributed most to the child's intellectual achievement. Surprisingly enough, such items as per pupil expenditure, number of children per class, laboratory space, number of volumes in the school library, and the presence or absence of ability grouping were of little significance. Teacher qualifications accounted for some of the child's achievement. But by far the most important factor was the characteristics of the other children attending the same school. Specifically, if a lower-class child had schoolmates who came from advantaged homes, he did reasonably well; but if all the other children also came from deprived backgrounds he did poorly.

What about the other side of the story? What happens to a middle-class child in a predominantly lower-class school; is he pulled down by his classmates?

According to the Coleman report itself, the answer to this question is a

reassuring "No". In his analysis Coleman found a differential pattern. The academic achievement of relatively deprived groups, such as Puerto Ricans, Southern Negroes, and Mexican Americans, was indeed markedly dependent on the background characteristics of their fellow students. In contrast, more advantaged groups, such as Northern whites and Oriental Americans, appeared to be unaffected by the background of their schoolmates. This pattern of results led Coleman to conclude "that the environment provided by the student body is asymmetrical in its effects, that it has its greatest effect on those from educationally deficient backgrounds". In interpreting this result, Coleman suggested that "that family background which encourages achievement reduced sensitivity to variations in school". In other words, good home background can immunise a child against debilitating effects of group contagion.

Unfortunately, Coleman's optimism appears at the very least to be overstated, since it can be called into question on several grounds. First, the analysis on which his conclusions were based was done solely at the level of schools, not of classrooms. In other words, it paid attention to the characteristics of the entire student body, and did not ask specifically about the backgrounds of the children who sat in the same room. Yet, to the extent that companions influence academic work, it is these classmates who should have the greatest impact. A subsequent re-analysis of the Coleman data, on a classroom basis, carried out for the United States Commission on Civil Rights, confirmed this expectation by showing that the beneficial effect for a disadvantaged child of being in a class with non-disadvantaged pupils increased substantially with the proportion that non-disadvantaged children represent of the class as a whole. Thus those disadvantaged children who were gaining the most academically were attending classes in which the majority of pupils came from white middle-class families. Moreover, these gains were substantially greater than any attributable to teacher characteristics or quality of instruction, a finding which led the authors of the report to conclude that "Changes in the social class ... would have a greater effect on student achievement and attitude than changes in school quality."



Finally, pursuing this same line of inquiry one step further, Thomas F. Pettigrew, in a special re-analysis of some of Coleman's data, showed that white children in predominantly Negro schools performed, on the average, below comparable white children in predominantly white schools; furthermore, "those white children in predominantly Negro school with close Negro friends" scored significantly lower on tests of verbal achievement than white pupils in the same school without "close Negro friends".

Analogous effects appear in the sphere of social behaviour as well. In a study still in progress involving 40 sixth-grade classrooms in a large city, we find that the willingness of the rest of the class to engage in antisocial behaviour (such as cheating on a test) is significantly increased by the presence of a small lower-class minority (in this instance, all white).

Finally, there is the evidence already cited from our own researches that the peer group has quite different effects in the Soviet Union and in the United States. In the former it operates to reinforce adult-approved patterns of conduct, whereas, in our country, it intensifies antisocial tendencies.

In summary, the effect of a peer group on the child depends on the attitudes and activities which prevail in that peer group. Where group norms

emphasise academic achievement, the members perform accordingly, where the prevailing expectations call for violation of adult norms, these are as readily translated into action. In short, social contagion is a two-way street.

How early in life do children become susceptible to the effects of such contagion? Professor Albert Bandura and his colleagues at Stanford University have conducted some experiments which suggest that the process is already well developed at the pre-school level. The basic experimental design involves the following elements. The child finds himself in a familiar playroom. As if by chance, in another corner of the room there is a person playing with toys. Sometimes this is an adult (a teacher), sometimes another child. This other person behaves very aggressively. He strikes a large Bobo doll (a bouncing inflated figure), throws objects, and mutilates dolls and animal toys, using appropriate language at the same time. Later on, the experimental subject (i.e. the child who "accidentally" observed the aggressive behaviour) is tested by being allowed to play in a room containing a variety of toys, including some similar to those employed by the aggressive model. Without any provocation, perfectly normal, well-adjusted preschoolers engage in aggressive acts, not only repeating what they had observed but elaborating on

it. Moreover, the words and gestures accompanying the actions leave no doubt that the child is living through an emotional experience of aggressive expression.

The Impact of Television

It is inconvenient to use a live model every time. Thus it occurred to Bandura to make a film. In fact, he made two; one with a live model, a second of a cartoon cat who said and did everything the live model had said and done. The films were presented on a television set left on in a corner of the room as if by accident. When the children were tested, the television film turned out to be just as effective as real people, with the cat arousing as much aggression as the human model.

As soon as Bandura's work was published, the television industry issued a statement, "Commentary on Bandura's Look Article", calling his conclusions into question on the interesting ground that the children had been studied "in a highly artificial situation", since no parents were present either when the television set was on or when the aggressive behaviour was observed. "What a child will do under normal conditions cannot be projected from his behavior when he is carefully isolated from normal conditions and the influences of society", the statement declared. Bandura was also criticised for using a Bobo doll (which is "made to be struck") and for failing to do a follow-up of his subjects after they left the laboratory. Since then, a student of Bandura's has shown that only a 10-minute exposure to an aggressive model still differentiates children in the experimental group from the control group (similar children not subjected to the experiment) six months later.

Evidence for the relevance of Bandura's laboratory findings to "real life" comes from a subsequent field study by Leonard Eron, now at the University of Iowa. In a sample of more than 600 third-graders, Eron found that the children who were rated most aggressive by their classmates were those who watched television programmes involving a high degree of violence.

At what age do people become immune from contagion to violence on the screen? Professor Richard Walters of Waterloo University in Canada and his associate, Llewellyn Thomas, showed two movie films to a group of 34-year-old hospital attendants. Half

of these adults were shown a knife-fight between two teenagers from the moving picture "Rebel Without a Cause"; the other half saw a film depicting adolescents engaged in art work. Subsequently, all the attendants were asked to assist in carrying out an experiment on the effects of punishment in learning.

In the experiment, the attendants gave an unseen subject (presumably a patient in the hospital) an electric shock every time the subject made an error. The lever for giving shocks had settings from zero to 10. To be sure the "assistant" understood what the shocks were like, he was given several, not exceeding the level of four, before the experiment. Since nothing was said about the level of shocks to be administered, each assistant was left to make his own choice. The hospital attendants who had seen the knife-fight film gave significantly more severe shocks than those who had seen the art-work film. The same experiment was repeated with a group of 20-year-old females. This time the sound track was turned off so that only visual cues were present. But neither the silence nor the difference in sex weakened the effect. The young women who had seen the aggressive film administered more painful shocks.

A third version of this experiment employed 15-year-old high school boys as subjects. With this group the designers of the experiment wondered what would happen if no film were shown. Would the continuing emotional pressures of the everyday environment of adolescents—who see more movies and more television programmes and are called on to display virility through aggressive acts in teenage gangs—provoke latent brutality comparable to that exhibited by the older people under direct stimulation of the movie of the knife-fight?

The results of the experiment were sobering. Even without the suggestive power of the aggressive film to step up their feelings, the teenagers pulled the shock lever to its highest intensities (levels eight to 10). A few of the boys made remarks which suggested that they were enjoying the experience of administering pain; for example, "I bet I made that fellow jump".

This fact raises an interesting question. Common belief holds that aggressive responses are most likely to be aroused when one has been mis-

treated. Presumably, one does not get angry without a cause. Yet a number of the experiments we have reviewed indicates that aggressive—and even cruel—behaviour can be induced in a person without giving him any ground for grievance, by simply allowing him to observe aggressive behaviour purely as a bystander. One wonders, is his reaction as great as that which would be aroused by a personal affront? And what is it about an aggressive stimulus that evokes an aggressive response? Specifically it is the sight of the aggressor, or of his victim, that arouses one's own hostile impulses?

Answers to these questions are provided by an ingenious experiment carried out in the course of doctoral research at Stanford University by D. P. Hartman. To maximise the likelihood of an aggressive reaction to a personal affront, the subjects selected for research were adolescent delinquent boys. In the first phase of the experiment, each boy "accidentally" overheard his future partner—an anonymous member of the group (actually a tape recording—making comments about him. For half the subjects, the comments overheard were essentially neutral, for the other half, they included a number of unwarranted disparaging criticisms. In the next phase of the experiment, the boys were divided into three groups. Each group was then shown a film which portrayed two teenagers shooting baskets on a court.

... In the control film the boys engage in an active but co-operative basketball game, whereas in the other two films the boys get into an argument that develops into a fist fight. The pain-cues film focuses almost exclusively on the victim's pain reactions as he is vigorously pummelled and kicked by his opponent. The instrumental-aggression film, on the other hand focuses on the aggressor's responses including angry facial expression, foot thrusts, flying fists, and aggressive verbalisations...

Following the procedure developed by the Canadian investigators, Hartman then asked each subject to assist in an experiment by administering shocks to his partner in the learning experiment, the same one whom he had previously overheard.

The results of the experiment are instructive in a number of respects.

First, they confirm earlier work in

demonstrating that exposure to film violence induces aggressive response. Both groups who had seen the fist fight administered more severe shocks than the controls who watched only the co-operative game.

Second, although subjects previously insulted gave higher shocks than those overhearing neutral remarks, this difference was not so great as that attributable to exposure to an aggressive stimulus. Specifically, the boys who had not been offended but who had seen the filmed fist fight administered stronger shocks than those who had been insulted but had seen no filmed aggression. In short, exposure turns out to be more powerful than insult in instigating aggressive behaviour.

Third, the fact that angered viewers behaved more aggressively than non-angered viewers after seeing filmed aggression calls seriously into question the so-called catharsis hypothesis developed from psychoanalytic theory. According to this hypothesis, stimuli such as films or comic books containing aggressive material perform a function in vicariously reducing aggressive impulses. It is on this basis that some psychiatrists have recommended giving toy guns to highly aggressive children and encouraging them to see violence on television. If films do function to release hostile impulses, then the teenagers in Hartman's experiment, especially those in the "insulted" group, should "feel better" after viewing the "fist fight" than after seeing co-operative play. In fact, the results were exactly the opposite, with the highest shocks being given by the boys who had been insulted and then shown the aggressive film.

Fourth, the effect of insult was greatest among the boys who had viewed the fist fight. Prior offence produced some increase in the control subject, "but not of statistical magnitude". In other words, it was only after the injured person was exposed to a new aggressive stimulus that he really gave vent to his anger.

Finally, pain cues and shots of the aggressive act were equally potent in arousing aggressive response. In other words, the sight of the suffering victim, far from reducing the aggressive reactions of the viewer, actually increased them. A similar finding emerged from the study by R. G. Geen and Berkowitz. Berkowitz, in a summary

of his research, says "the confederate's aggressive cue value apparently varied directly with his association with the victim rather than the giver of the observed aggression".

The implications of these research findings for the impact of television on its viewers are obvious. Given the salience of violence in commercial television, including cartoons especially intended for children, there is every reason to believe that this mass medium is playing a significant role in generating and maintaining a high level of violence in American society, including the nation's children and youth.

But the studies speak not only to the effect of television, but to the impact of models generally, and peer group models in particular. It is not irrelevant that, in the Canadian experiments, the subjects who exhibited the highest level of aggression after seeing a film of a teenager knife-fight were themselves teenagers. The impact of peer pressure in inducing aggressive response has been nicely isolated in a study by Stanley Milgram in a variant of what has come to be known as the "Eichmann experiment". Using male college students as subjects, Milgram set up a situation in which the level of shock to be administered was determined by the lowest level proposed by any one of three "assistants", two of whom were confederates of the experimenter and called for increasingly higher shocks. Even though the true subjects could keep the intensity to a minimum simply by stipulating mild shocks, they increased the degree of pain administered in response to the confederates' pressure.

Yet, as we have seen, the peer group need not necessarily act as an impetus to antisocial behaviour. Among Soviet youngsters, it had just the opposite effect. Why? The answer is obvious enough. The Soviet peer group is given explicit training for exerting desired influence on its members, whereas the American peer group is not. Putting it another way, the Soviet peer group society is heavily—perhaps too heavily—influenced by the adult society. In contrast, the American peer group is relatively autonomous, cut off from the adult world—a particularly salient example of segregation by age.

What explains this difference is of course the social development in two large, highly industrialised countries? With respect to the USSR, a series of

historical factors fostered the development of strong and widely diffused dependency relations between children and adults. In addition, the primacy of the collective in claiming loyalty and submission, across age and family lines, has deep roots in Russian history.

Looking Backward

The American pattern, too, has its historical antecedents. Perhaps in the first instance these derive from the fateful separation of Church and State, which, as it freed the schools of religious control, also fragmented the process of education. The primary responsibility of schools became the teaching of subject matter. Character education, or what the Russians call *vospitanie*, was left to the family and the church. The role of the church in moral education has withered to a pallid weekly session at Sunday school. And, as we have seen, the family, primarily because of the changes in the larger social order beyond its control, is no longer in a position to exercise its responsibilities. As for the school—in which the child spends most of his time—it is debarred by tradition, lack of experience, and preoccupation with subject matter from concerning itself in any major way with the child's development as a person. Questions of conduct become of legitimate concern only if they "interfere with the lesson". The vacuum, moral and emotional, created by this state of affairs is then filled—by default—on the one hand by the television screen with its daily message of commercialism and violence, and on the other by socially isolated, age-graded peer group, with its impulsive search for thrills and its limited capacities as a humanising agent.

It is noteworthy that, of all the countries in which my colleagues and I are working, now numbering half a dozen both in West and East, the only one which exceeds the United States in the willingness of children to engage in antisocial behaviour is the nation closest to us in our Anglo-Saxon traditions of individualism. That country is England, the home of the Mods and the Rockers, the Beatles, the Rolling Stones, and our principal competitor in tabloid sensationalism, juvenile delinquency, and violence. The difference between England and America in our results is not great, but it is statistically reliable. England is

also the only country in our sample which shows a level of parental involvement lower than our own, with both parents—and especially fathers—showing less affection, offering less companionship, and intervening less frequently in the lives of their children.

Looking Forward

In summary, it is our view that the phenomenon of segregation by age and its consequence for human behaviour and development pose problems of the greatest magnitude for the Western world in general and for American society in particular. As we read the evidence, both from our own research and that of others, we cannot escape the conclusion that, if the current trend persists, if the institutions of our society continue to remove parents, other adults, and older youths from active participation in the lives of children, and if the resulting vacuum is filled by the age-segregated peer group, we can anticipate increased alienation, indifference, antagonism, and violence on the part of the younger generation in all segments of our society—middle-class children as well as the disadvantaged.

Why should age-segregation bring social disruption in its wake? The dynamics of the process are not difficult to see. However important genetic factors may be in the determination of human behaviour, it is quite clear that such qualities as mutual trust, kindness, co-operation, and social responsibility cannot be insured through selective breeding; they are learned from other human beings who in some measure exhibit these qualities, value them, and strive to develop them in their children. It is a matter of social rather than biological inheritance. Or, as one of the author's teachers, Walter Fenno Dearborn, used to put it; "He's a chip off the old block—not because he was knocked off it, but because he knocked around with it." But in either case, transmission cannot take place without the active participation of the older generation. If children have contact only with their own age-mates, there is no possibility for learning culturally-established patterns of co-operation and mutual concern.

As it is frequently the case, it is literature which provides us with the most revealing picture of psychological process and effect. In *Lord of the Flies*, William Golding describes the course of events among a group of pre-ado-

lescent boys marooned on an island. Patterns of civilised human relationships, epitomised in the person of "Piggy", are as yet too shallowly rooted, and are soon destroyed by the quickly rising sadism of peer power. Piggy is brutally killed just before the adult rescuers arrive. Their first question: "Are there any adults—any grown-ups with you?"

The message of the allegorical ending is clear, and, in our view, dictated no less by literary insight than the independent data of behavioural science. If adults do not once again become involved in the lives of children, there is trouble ahead for American society.

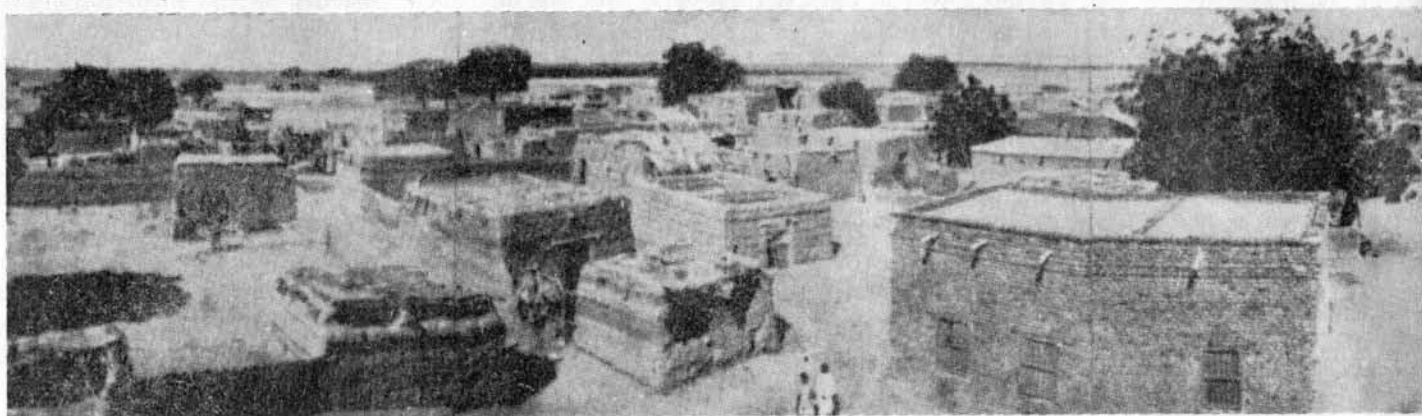
New patterns of life have developed in our culture. One result of these changes has been the reduced participation of adults in the socialisation of children. Although, to date, this pattern has continued to gain acceptance, there is reason to believe that it can do harm to our children and to our society. We are therefore faced with the necessity of developing a new style of socialisation, one that will correct the inadequacies of our contemporary pattern of living as it is affecting our children and provide them with the opportunities for humanising experience of which they are now bereft.

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The Sudanese heat trap

The Sudanese desert is a harsh environment with wide fluctuations in temperature between a devastating heat at midday and near freezing at night. The people of Sudan have developed a style of life which has enabled them since time immemorial to survive in this environment. Their buildings and their clothing – derived locally from natural materials – provide relief from the extremes of temperature. Today the Sudanese are abandoning the traditional way of life for a westernised one, using ferro-concrete buildings, western clothes and modern gadgetry such as air conditioners to keep cool. Not only is the new-found way of life costly in terms of expensive imports, it is also socially disruptive.

by Allan Rodger

Sudan has a short coast-line to the Red Sea and land frontiers with Ethiopia, Kenya, Uganda, Congo, Central African Republic, Chad, Libya and Egypt. Its capital city, Khartoum, sits at the confluence of the Blue Nile and the White Nile where they form the River Nile itself, and from which this great river sets out on its two thousand mile journey through the deserts of Sudan and Egypt to its delta in the Mediterranean. For most people, Khartoum conjures up in the mind ideas of mystery and the unknown rather than facts. For those who live there, however, it is self evident that the characteristic of their town which most impinges on their consciousness is the heat. Of all the capital cities in the world, this one is reputed to enjoy the highest average temperatures.

Within the limits of the resources available to them the people who live here and whose families have lived here for generations have developed a way of life and types of buildings in response to this severe environmental problem. Now, as the country embarks on a programme of development, the style of life is changing in response to the pressures and influences of the more industrially developed world.

It is the climate and the land which define the physical environment within which people must live their lives. These two factors interact with each

other. The climate establishes the conditions within which the flora and fauna develop on the land, and in turn the climate is itself modified by the vegetation cover of the land. It is within this complex inter-active system that man must procure his basic requirements of food and shelter. And he must do it in such a way that he does not degrade the environment on which he is ultimately wholly dependent.

Although in Sudan heat is a continuing problem, temperatures are far from constant. There are very significant diurnal variations typical of desert regions, and seasonal variations in temperature, rainfall, humidity, and wind, all of which have an important bearing on standards of comfort. During the early part of the summer from May till July temperatures of over 100°F (38°C) may be expected every day with occasional maxima as high as 115°F (46°C).

The low temperatures occurring during the night may be as low as 75°F (24°C) with an average of 80°F (27°C). The humidity is low and there is some wind from the South. This is the period of the year when Khartoum experiences its great dust storms known as haboobs. In the later part of the summer until the end of October lower daily maximum temperatures are to be expected but much higher humidity, occasional heavy rain storms and—

generally—much less wind. Although the maximum temperatures are lower at this time of year there is a smaller diurnal variation and night-time temperatures remain high. Winter comes to this region quite suddenly within the space of a few days. The wind comes out of the North, sweeping across the deserts from the cold Mediterranean to establish a new climatic regime. There is a great sense of relief after the hot humid environment of late October. Humidity is now very low. The sky is completely clear. The wind blows steadily. Perhaps only in Khartoum could daily maxima of 88°F (31°C) to 95°F (35°C) be welcomed as the beginning of winter. Night-time temperatures may drop as low as 43°F (6°C) but 64°F (18°C) would be more normal. The thermal stress which is caused by this climatic pattern is in part due to the high mid-day temperatures which occur within the course of a few hours.

Much of the soil round Khartoum is very fertile. If there is a plentiful supply of water almost anything can be grown. But the climate does not provide this supply of water. There is just a short wet season and then complete drought. As a result, the natural vegetation cover of the countryside is very light, consisting mainly of various types of acacia scrub with sparse grass and a few prickly bushes below. Along the

water course to which the surface water drains during a storm, and below which the water table becomes high, there is more growth. By the river there are palm trees, and in the river itself, in places where there is little current, there is papyrus grass. Within short distances of the river where the levels are suitable, there is intensive cultivation of the land by irrigation methods for the production of food and fodder. Recently an area to the south of Khartoum has been irrigated and planted with trees in an attempt to reduce the effects of the dust storms.

(This area is now, as a by-product, producing valuable timber). To the south of this belt lies the vast irrigated cotton growing area of the Geziera.

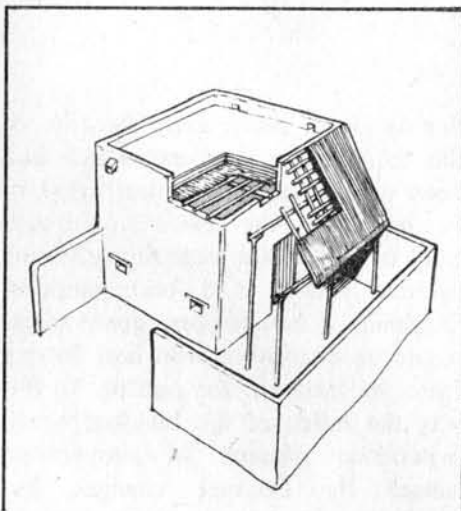
The very light natural vegetation of the area is fragile. It can provide only a very small annual crop which must be carefully balanced by the annual productive capacity of the land. This balance is easily upset if the population and their animals over-crop the land. When this happens the result is complete degradation of the plant cover and the formation of desert or semi-desert with no crop at all. This is something that the population just cannot afford. In former times the plant cover was protected by custom, taboo, and the ever present threat to survival. Now there is strict legislation which controls the cutting of timber. But there is no protection for the land from the ravages of over-grazing and the mechanical wear and tear caused by man and his machines.

Yet people everywhere live off the land. Their needs are real even though their resources may be small. The production of food must be the first priority. Crops are grown only in those small areas which are specially favoured by being easily irrigated or which are naturally supplied with water by the ground form and the ground water table. The main edible produce of these areas is cereals. The rest of the land is cropped by domestic animals which in turn provide the population with eggs, milk, meat and skins. Both these sources of food, the cereals and the animal products, need cooking, and consequently a people who must live on them must also have a source of fuel in proportion to their food. In the northern Sudan timber is the only naturally occurring fuel and it is in short supply. But only after the fuel needs for cooking have been satisfied

can timber be used for other purposes such as the construction of buildings.

For all traditional building, which is the great bulk of all building, it is the earth itself which is the building material everywhere available and in plentiful supply. As it happens, the soil in the area of Khartoum is particularly suitable for the purpose. With the addition of water, the soil forms a thick cohesive clay mud which may be used for building in several different ways.

The simplest and most direct method is to construct walls by placing one layer on top of another. Each layer is allowed to dry out sufficiently for it to become firm before the next layer is applied; in the Khartoum climate this is not very long. More precise work can be done by forming the mud into bricks and allowing them to dry in the sun. After a day or two these are ready to be built in a mortar formed from the same mud. In this way the drying out process, and the shrinking and cracking which is associated with it, is much more evenly distributed throughout the wall. As a result a much more even



House construction in Jalous and mud bricks. The view is cut away to show construction.

consistency of construction is achieved. Spreading the shrinkage problem in this way leads to more accurate building and much stronger walls. Even greater strength can be achieved if fired bricks are used. For this the mud must first be mixed with some straw or hay before the bricks are moulded and laid out in the sun to dry. They are then loaded into a kiln and fired with timber as the fuel. The result is a brick which has high thermal insulation, greater strength than mud bricks, and which will not be eroded by rainfall. This is apparently a better product in every

way—except that it puts an additional demand on the very limited supply of timber.

After walls comes the problem of roofing. The great tradition for roofing large buildings in desert regions is the vault or dome. Similar techniques have been used in the trogloditic settlements in the far north of Africa for domestic buildings. There is also an old tradition of barrel vault construction indigenous to the Nile valley which has recently been revived and redeveloped in the recent work of Hassan Fathy at Gournah. Other traditional and cultural influences are also at work, however, and the tradition of the people is to build rectangular buildings with flat roofs which almost inevitably require the use of timber for their construction. This is the tradition of the Arab peoples coming from the north, where at one time timber was readily available from the forests of the Levant. The method used is to set timber beams, frequently formed from the trunk of a palm tree, to span between two mud walls. Stiff matting is then formed from the leaves of the palm tree to span between these beams. On this base mud is placed in several layers to form the main roof construction and provide the waterproofing. Just as the mud shrinks when it dries out, so, it expands when it again gets wet. In this way any small cracks which may have developed are onset of rain. The rain water is then collected to be discharged well clear of the building through the spout.

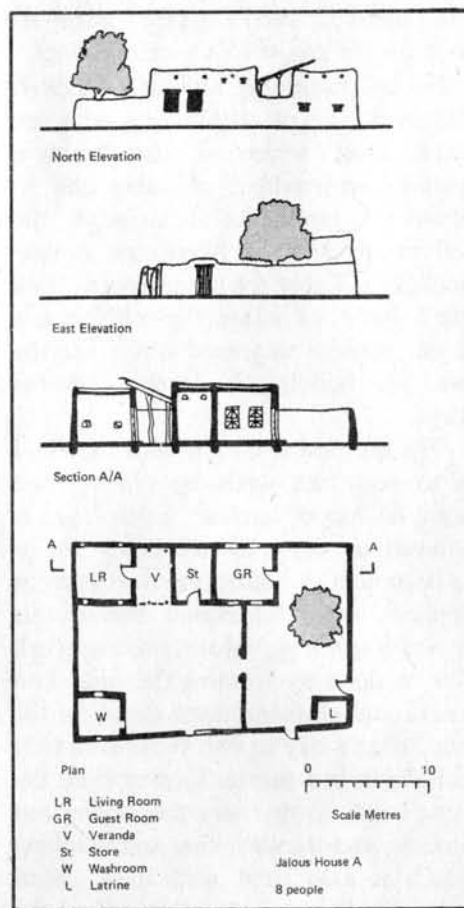
All the wall surfaces, inside and outside, and the top surface of the roof are coated with a layer of mud mixed with fermented animal dung. This material with a fibrous matrix in it is much more dimensionally stable than mud alone and much more resistant to erosion by the impact of rain or the flow of water.

Only small windows are used and these are fitted with timber shutters.

In the villages round Khartoum there are interesting variations in the form of the buildings. To the north, where the climate is a little drier, the flat roofed, rectangular building of the Arab tradition is found. To the south of the city different forms are to be seen. Two factors are mainly responsible. To the south of Khartoum, attracted to the great irrigation scheme of the Geziera, there are large numbers of people from the west of Sudan and indeed from the west of Africa. This area also lies astride the most northerly east-west

route in Africa south of the Sahara. This is the road to Mecca for the Muslim communities which are found all the way along the southern margin of the desert. These people have quite different concepts of what a house ought to be like. They bring with them the traditions of people who are accustomed to much more rain than is found in the northern Sudan. Such people cannot depend on mud construction, good though it may be for warding off the occasional rainstorm. They have based their forms on the high priority which they must give to protection from rainfall. They make their roofs of thatch, and they make their buildings round. They are able to do this south of Khartoum because in the shallows by the banks of the White Nile there is papyrus grass which is ideally suitable for thatching. And in this slightly wetter area great quantities of dura—a kind of maize—are grown. The straw of this plant can also be used for thatching and it is suitable for weaving into mats. In this area the walls of the round buildings are constructed either of mud or of these straw mats on a light timber frame. These round buildings are relatively new to the region. They represent the concepts of the people who build them in terms of the technical information and skills which they have.

Almost all of the building in Khartoum itself is one form or other of mud roofs on timber support. How does this type of building perform in the climate of this area? Let us for a moment ignore the problem of what the building is to be used for, even though we know that the great bulk of all building everywhere on earth is mainly domestic. Buildings with mud walls, mud roofs and mud floors are heavy. They contain large amounts of material. When a building of this type is exposed to heating by the sun or under the influence of high outside air temperatures it takes a considerable time for the building itself to be heated up. During this time the internal air temperatures will be lower than the outside surface temperatures, and there will be a gradient of temperature through the walls and roof from high on the outside to low in the inside. If the heating were now to be stopped and the outside temperatures became low, then heat would begin to flow from the outside of the building outwards. At the inner surface heat would continue to



Plan of Jalous House

flow into the inner space because of the temperature gradients which had been established during the period of heating. Thus the inside would continue to heat up for some time after the external heating had been stopped. Gradually a new temperature gradient would be established with heat flowing from the inside to the outside. In this way the inside of the building would experience changes in temperature caused by external changes but displaced in time from them. The extent of the delay between the external and internal thermal variation is determined by the thermal capacity and the thermal resistance of the building materials. Effectively this depends on the thickness of the construction. Real buildings in Khartoum are exposed to heating and cooling on a 24-hour cycle. Under these conditions heavy mud construction also results in much smaller internal variations than those experienced externally.

These are the characteristics of the buildings which the people are able to construct from the materials available to them. They use them in a most interesting way.

The buildings and the use to which they are put have evolved together in such a way that it is no longer possible to say that the buildings are a direct response to the pattern of living nor that the way of life is determined by the buildings and the environmental conditions. Each is nicely matched to the other. Living patterns change through the year in response to the changes in the climate. During the summer activity begins before sunrise so that a start can be made to the work of the day while it is still cool. Except for a short stop for breakfast at about 9 o'clock work continues till a little after mid-day. By this time the temperature is approaching its peak. People then eat a little and retire inside their houses for the afternoon rest. At this time of day the internal temperature of the buildings is still well below the outside air temperature. The buildings are therefore providing a definite environmental benefit at this time. Late in the afternoon when the outside temperature is well past its peak and the internal house temperature is still rising, activity starts again but transfers outside. A little food will be taken while sitting outside on a terrace or on a veranda. Trading activities then resume for about two hours in outdoor market areas. The later part of the evening is then spent outside in courtyards and gardens. Since at this time of year the desire is always to find the coolest available place it is usual to sleep outdoors under the cool desert sky. In this way the people are using buildings to protect themselves from the worst heat of the afternoon and are then avoiding the use of buildings for all other times when outside conditions are more favourable. But the buildings not in use are not forgotten. As soon as it becomes cooler outside than in, the windows and doors are opened and the air allowed to blow through. The fabric of the building is cooled both from the outside surface and the inside surface. Ventilation is continued until an hour or two after sunrise. Then all the openings are sealed up in defence against the rising outside temperatures. The coolness of the night is secured for use later during the day. This controlled ventilation of heavy buildings makes a significant reduction in the day-time temperatures inside, thus greatly improving the working conditions during the morning and the rest conditions for the afternoon.

In the winter, the people go about their daily routines in much the same way that they manage and use their buildings. The nights can be uncomfortably cold, so it is usual to sleep inside with only very limited ventilation. The building which has been heated up during the previous day provides warmth. As soon as the outside air temperature becomes comfortable again the building is ventilated. The very dry conditions at this time of year cause rapid evaporation and as a result, any breeze has a marked cooling effect. During the heat of the day ventilation is therefore most welcome. The rest period taken during the afternoon may well be spent sleeping in a shady well-ventilated space such as a veranda or under a tree. Depending on the actual temperatures which are being experienced at the time, the building may be ventilated to absorb the heat of the day for use during the night.

These broad principles admit many subtle variations and adjustments in response to changes in the daily weather pattern or to differences in the way of life between one family and another. What all have in common is not so much the concept of a "house" but rather the idea of a bit of land which is screened for privacy and which contains some enclosed internal space, and some outside space. This whole thing taken together is thought of as the home environment. Each part within this is used as seems most appropriate in the circumstances.

Clothing is also important in achieving a degree of comfort under difficult environmental conditions. Indeed, when the problem is one of low temperatures, suitable clothing may be critical for the very survival of the people. As ambient temperatures rise, less and less clothing is needed. Especially where there is plenty of shade such as the forested regions of the tropics the ideal attire may be almost nothing at all. Where there is a high level of direct solar radiation as in Sudan this at least must be kept from the skin. Yet any garment will prevent the free flow of air which is so necessary for good cooling by the evaporation of sweat.

The solution adopted by the Sudanese is a light cotton covering from head to foot. For the men this is the long loose fitting robe known as the djallabiya, and for the women, the long cotton winding cloth—similar to the sari—known as the tobe. Both of these

are made of very lightweight material and are usually white in colour to reflect as much as possible of the sun's heat. As people move in these garments air circulates freely round their bodies. Any sweat which is not directly evaporated from the skin is absorbed by the cotton fabric where it evaporates to the outside air and in so doing cools the cotton.

The way that the people hold themselves is also important for their comfort. When they sit they keep their legs well apart and their arms well clear of their body to allow ventilation past the sweat glands. When they move they do so slowly and in a relaxed manner, thus keeping to a minimum the internal generation of heat.

These aspects of the traditional life and environment of the people of Khartoum form a tightly woven web in which all the parts are closely related to the others. Only when it is seen as a whole does it make sense.

Their behaviour, too, is well adjusted to the environment. It can be quite an advantage to be located in just the right place to catch a breeze. To be in just the right place at the right time is a skill which the people exercise all the time whether it be in picking a place to sit in a garden, deciding just where to place a desk within an office, or so wending your way along a busy street as to take maximum advantage of any shade which might be available on the way. All these things are done with considerable skill and apparently without so much as a thought. Yet they make a significant contribution to the standard of physical comfort.

These aspects of the traditional life and environment of the people of Khartoum form a tightly woven web in which all the parts are closely related to the others. Only when it is seen as a whole does it make sense. Indeed it is the whole system and the set of relationships which it contains that is important rather than any of the constituent parts, yet it is those parts which give the system reality, and through which the system has evolved and is continuing to change.

Most changes in the past might be described as evolutionary. There might have been small changes in the climate

from one year to the next or even from one decade to the next. Life style could vary from one family to another.

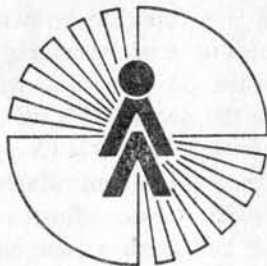
There would be small variations in the methods of building, and so on through many aspects of life and the environment. In each case the small change from the norm would have its effect in the system as a whole and it would be tested out within this context. If it was found to be beneficial it would tend to be more widely adopted if this were possible and within the control of the people. If it were outside human control, such as a change in the climate, then other, controllable aspects of the system would adjust to accommodate it and form a new balance.

Now the situation has changed completely. Man's ability to cause change, and his desire to do so, have greatly increased. No longer are we willing to introduce small changes and watch how they affect the whole system. Now changes are occurring at a rate at which it is impossible to evaluate their full implications, and it may be those implications rather than the original change which in the long term are the most significant.

It was only at the end of the nineteenth century that Sudan was first exposed to influence from Europe. Prior to that it had been controlled by Egypt and Turkey. Until the mid-fifties the country was the Anglo Egyptian Condominium of the Sudan, an arrangement under which the Head of State was the King of Egypt and the administration of the country was carried out by the British Civil Service. This period established many strong links with Britain but the British administration took to Sudan such experience of the high temperature, low technology environment which they had long administered in India. So it was not until independence came that the country found itself for the first time unrestrained by outsider influence and free to choose its own direction. Despite the strong influence of Islam, the Arab world and a conservative political party, the direction chosen has been towards the life style and technology of the developed world—a world located mainly in the temperate zone. This change in circumstances has afforded the opportunity for expression of the attitudes and aspirations of the people and has led to a change in the image of the successful man. Now he is thought of wearing a white shirt and a tie. The

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shirt is tucked in at the waist. The image includes dark full length trousers and tight fitting lace-up shoes. For more formal occasions a dark worsted suit would be thought to be appropriate. This garb is designed specifically to reduce the loss of heat from the body by restricting the flow of air at the waist, the neck and the cuffs. The jacket provides additional insulation to prevent losses by conduction through the fabric.

Perhaps even more important than the clothes themselves is the idea which goes with them of how people ought to sit neatly and compact, and how they ought to walk briskly and with purpose. All these characteristics, the clothes and the image, are in direct conflict with the environment.

Generally people who have these aspirations and behave in this way are also in positions of considerable influence and are in some ways the social leaders of society. Dressed in this way they naturally feel even more uncomfortable than they would have done if dressed in more traditional clothes, and as the leaders, there is something that they can do about it. They install fans to move the air and create a cooling breeze. This allows them to feel a bit more fresh and to straighten and perhaps tighten their tie. When it gets really hot in mid-May the fan is not enough. Evaporative coolers are then installed, and when in September and October the humidity is so high that evaporative cooling does not work, then it is necessary to install full refrigeration. Each of these cooling systems requires quite different buildings if it is to be efficient. Buildings constructed to be used with one may be grossly inefficient or even ineffective when used with another. In addition, all of the equipment is imported and consequently has to be paid for out of very limited supplies of hard currency. They also have to be maintained in part in this way, and since Sudan has no oil or coal, the electricity to drive it must be generated by imported generators with imported fuel oil.

Nor does the process stop at the place of work. Having obtained a cool environment there of perhaps 75°F or 80°F (24°C-27°C) clothing must be adjusted accordingly. At these temperatures a shirt, tie and jacket are almost essential. The outside temperatures in the street and at home are now almost intolerable for someone dressed in this

way.

He is therefore forced by his own style of dress to extend his cocoon of cool air right through his own private environment, first to his home, and then, if he can afford it, to his motor car. His whole family now enter the spiral. They too become accustomed to the benefits of artificial cooling and become more and more dependent on it. They quickly lose the skills of managing their own environment. They have abandoned this to the machine. They become selective in where they go, shopping in only the coolest shops. In time another group of people must enter the same process and themselves become dependent.

It is ironical that when air-conditioners (refrigeration devices), are used, they pump heat from inside the buildings and discharge it to the outside air. In addition they consume electrical energy which also becomes heat and is discharged to the outside. In this way the outdoor atmosphere of the town becomes even hotter and less comfortable, so increasing further the desire for cooling. Inevitably this cannot be available to everyone.

In a very rich country such as the Gulf States or Libya this would not present any serious economic problem, at least so long as their oil lasts. But for the Sudan this is not the case. There, every dollar of hard currency has to be won by export of the produce of the land and in the very restricted international market conditions which apply to long staple cotton, gum arabic, peanuts, various natural oils and the export of animals. It would be a pity if those resources which might be used to strengthen the base of the economy were in fact used to cool some internal space and add to the already high outside temperatures. And especially this would be so if the apparent need for this is based on a blind following of the aspirations of the industrially developed world.

The process of change which has been described for Sudan could be found in differing form in many hot underdeveloped countries and indeed in all underdeveloped and developed countries alike. The impact of technological change may appear first on the physical environment; but it also impinges on the social, economic and cultural environment. It is only within this broad view of the environment that technology can be realistically assessed.

There are 11 packs of otter hounds in England and Wales, two in Ireland and one in Scotland. Although a season exists for otter hunting, from April to October, this is not official. It is derived mainly to fit in with the closed season for fox hunting rather than to benefit the otter, which breeds at no fixed time of the year. Each hunt usually meets twice a week during the season, at mid morning, near the river bank where it has been chosen to put the hounds in the water.

All otter hunts have a distinctive uniform for their members to wear. This usually consists of a coloured jacket, cap, tie, trousers and socks. Blues and reds are predominant, blue being the traditional colour. Members also carry long poles, which are used to assist the owner in fording fast flowing rivers, and to check the depth of water. They also serve to act as a tally for each owner, who carves a notch on it for each kill he has attended, and also to prod otters at close range and to form stickles, but the later practice is now banned by the British Field Sports Society.

The hounds used in otter hunts today are either Foxhounds or Otter hounds, the latter being the true ancient breed for the sport. Jack Russell terriers also accompany the hunt. These normally follow at the rear, and are only freed when they are required to enter holts, to bolt an otter, should the need arise.

The basic principle in the hunt is to find an over-night drag or scent left by an otter, and when found, the hounds behave excitedly and bark. This barking is called the "music" of the hounds, and the dogs are said to be speaking to the scent. The drag is then quickly followed and eventually an otter may be found, usually in its holt, where it is resting for the day. If the holt is a cavity in the river bank, the otter must be bolted before the chase can start. This may be done by using the terriers or by beating the ground directly above the holt with sticks. If neither of these methods work, the holt is dug open and the terrier dogs are put in at the back of the holt to drive the otter forwards into the open, while the hounds are held back. The tools for this operation are carried in a motor vehicle, which follows the course of the hunt by road.

If, after the chase, the otter fails to get away, it will eventually be cornered

Otters

Ever since Gavin Maxwell wrote his book "Ring of Bright Water" many people have become aware of the otter. What they have not realised is that this creature is still being hunted in Britain. Otter hunting might be more acceptable if the otter were common but the animal now appears to be becoming increasingly rare.

by Richard Westlake



again, probably in another of its holts. Several hunts now spare some otters in areas where their population is low. However, if the hunt-master decides in favour of a kill, the otter is again bolted out of the holt into the waiting pack of hounds.

As soon as the hounds have performed the kill, they are called off, and the "trophies" on the body are cut off. These trophies consist of the "mask" (head), "rudder" (tail), "pads" (feet) and occasionally the penis bone if it is a male animal. These bones are often worn as tie pins by the followers of a hunt. The trophies are then awarded to members of the hunt at the discretion of the hunt-master, as rewards for merit shown during the hunt. The remaining carcass is then thrown to the hounds.

Despite the obvious difficulties in spotting otters it is now accepted on all sides that the population is declining. Many of Britain's rivers are heavily polluted, and an increasing number of river banks are cleared, aiding free drainage and reducing management costs for the landowner. Such clearance destroys the otter's natural habitat. There are perhaps many other reasons for the otter's decline but some people believe that otter hunting has taken its toll.

Some figures for otters killed by hounds are known. In the "Otter Report", published in 1957 by the Universities' Federation for Animal Welfare, M. Stephens maintains that the average number of otters killed by hunting each year during the period 1949 to 1953 was 203. This general level of killing was continued into later years, and 205 otters were killed in 1957. Ten years later only 51 were killed, a figure which dropped to 19 in 1970. It has become clear that otter hunting is not the main cause of the decline in numbers in Britain, but according to Stephens hunting does have an effect—even when there is no killing—by disturbing the otter's habitat.

"It seems that the movements and habitat of the otter are largely influenced by the availability of food and the absence of persecution. Certainly, in areas where there is sufficient food, but where regular hunting occurs, there are fewer otters", she says.

The activity of otters is probably beneficial to man's immediate interests. The animal is no pest to agriculture.

Few River Boards in England and Wales consider it necessary to destroy otters. Within fishing interests, it is true that an otter will occasionally take a salmon or a trout, sometimes perhaps, even leaving it on the bank without eating it. However, the bulk of fish caught tend to be eels and other slower coarse fish, some of these the very predators of game fish fry. An otter will also include in its diet frogs and occasional moorhens, which also predate upon the spawn of game fish. It is also argued that the game fish that are taken by otters are often poor specimens, these being the easier to catch, and that therefore the otter is improving the strain of fish left. A water-bailiff was once reported as saying, that if an otter caught a trout, it was a small loss to suffer, due to the probability that that otter had also killed 40 pike, which would themselves have taken many more trout. In addition, other keepers are reported by Stephens, in the Otter Report, as believing that otters are sometimes blamed for the work of herons and other predators, including human ones. The control of the otter population seems therefore to be unnecessary, especially by means of such a cruel sport.

It is often claimed by those opposed to the sport, that as the otter is capable of breeding in any season of the year, the hunt may very easily chase a pregnant animal. This argument is, however, largely incorrect. During the pregnancy of the otter, the scent of the animal diminishes, this being a kind of safety measure provided by nature itself. Hence, the otter hounds would not probably find such an otter. This diminution of scent last through the time of birth and the subsequent suckling of the cubs. However, upon weaning the bitch gives off a greater amount of scent than normal. This makes her particularly vulnerable, as she still has dependent cubs to feed, for which she must now hunt for food. Thus, the argument is not altogether defeated. There have been recorded incidents of the dog otter assisting in bringing up cubs, but this does not seem to be the general case. The devotion of the bitch to her cubs is astounding, and several known incidents have occurred where the otter has stayed in the vicinity of her cubs, in the face of hounds and human intruders. Members of otter hunts have said that

if the hounds trace a drag to a holt and eventually bolt an otter, but remain around the holt, indicating a second scent, being that of the cubs, they will immediately call the hounds off. The chance of no otter with dependent cubs being chased, however, seems hardly to stand up to scrutiny.

The otter is now in danger of extinction in many counties of England and Wales, and needs every encouragement to repopulate these areas and breed. Much can be done to stop otter hunts. It only requires the owners of two opposite river banks to refuse the hunt access, and a stretch of a river is safeguarded. Many owners have already done this, in particular along the River Usk and River Wye in Breconshire, through the encouragement of the Breconshire County Naturalists' Trust.

The alternative to this type of action can only be legislation. Such protection would certainly not be new, for the otter is already a protected animal in many countries, both on the continent and overseas. It seems the only alternative to the rapid extinction of this beautiful and interesting animal in this country.

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Reports

Cabora Bassa

Over 450 years ago Portuguese expeditions penetrated up the River Zambezi. Three hundred kilometres from the river's mouth they were confronted with treacherous waterfalls and rapids at a narrow gorge which their slaves called "Kebra Bassa"—which means "where the work stops". Now, four centuries later, the work has started again. The Cabora Bassa gorge, situated in Mozambique's Tete province, is now the site of what is planned to be the largest hydro-electric project in Africa, dwarfing Kariba and Aswan, and the sixth largest in the world. The first power station, on the south bank of the river, is scheduled to produce 1,224 megawatts of electricity by 1975 and a further 816 by 1979. A second power station on the north bank is envisaged for completion in the 1990s and will supply a further 2,000 megawatts. This gigantic scheme, if completed, would thus have a total generating capacity of over 4,000 megawatts.

But Cabora Bassa is much more than a dam and a couple of power stations—it is part of a Portuguese strategy to turn the entire Zambezi Valley into a densely-populated military-industrial complex. Along with the project will go a network of roads and airfields, and a massive influx of white immigrants. No precise figures of the number of hoped-for immigrants have been issued by Lisbon, but in 1970 the Portuguese Chief of Staff, General Venancio Deslandes, was speaking in terms of no less than a million white settlers. This massive colonisation would be of inestimable value to Portugal in a direct military sense; in its war against FRELIMO (Mozambique Liberation Front), which has now entered its tenth year. Portugal hopes to eliminate the disadvantage of moving among a thoroughly hostile

population by creating in the Zambezi valley a massive settler population totally mobilised in support of Portugal's war aims.

A lot is at stake here for the other white minority regimes in Southern Africa. The Smith government in Rhodesia will benefit from the fact that the Zambezi will be made navigable from the Indian Ocean to the Rhodesian border, thus providing a much-desired outlet to the sea. And South Africa itself, the industrial heart of the sub-continent, plans to buy 80 per cent of the power that Cabora Bassa will produce. A cheap and massive source of electricity would be invaluable for the maintenance of the economic system of apartheid in South Africa.

South Africa is also vital to the project as a supplier of technical knowledge (particularly drilling and blasting techniques) and equipment. South African firms dominate the ZAMCO consortium which has the contract for building the dam. Harry Oppenheimer's Anglo-American Corporation leads the consortium and the President of ZAMCO is an Anglo-American director, Ted Brown (on record as saying of the Portuguese "They are tough, disciplined people. There may be something to be said for living under a dictator after all. The Portuguese have no student riots. There are no long-haired layabouts"). In all some two thirds of the capital invested in Cabora Bassa is South African. The other major participants in the consortium are French and West German firms. There is a small British involvement through British Electric Traction, whose subsidiary United Transport Overseas holds three of the project's main transport contracts. ICI via its South African associates company African Explosives and Chemical Industries, and GKN which, according to a South Africa House press release has set up a plant in Mozambique specifically to manufacture equipment for Cabora Bassa. Other firms such as British Leyland and Babcock and Wilcox have set up plants in Mozambique in the hope of cashing in on the general industrial expansion which is expected to be generated by Cabora Bassa.

The rights of the Mozambican Africans who actually live in the Zambezi valley have of course been viciously trampled on. At least 25,000 have been evicted from their homes to

make way for the project, and the Portuguese are avowedly going ahead with attempts to herd the entire rural population of Tete province into "aldeamentos" or "strategic hamlets". These "aldeamentos" are structures surrounded with barbed wire and closely guarded by Portuguese troops in the hope of isolating FRELIMO's guerrilla fighters from the people.

For the careful plans of the Portuguese and the South Africans have been badly upset by the activities of FRELIMO, whose advance into the very centre of Mozambique has been much more rapid than the colonialists expected. One of the major reasons for building Cabora Bassa in the first place—to create a line of defence that would confine FRELIMO north of the Zambezi—was negated in 1971 when FRELIMO began widespread military operations in Southern Tete. The savage Portuguese reprisals which have taken place in Tete intermittently over the past few years (the Wiriyamu massacre being only the most notorious example) have not hindered the development of FRELIMO. Transport throughout Tete is crippled and has been for the past two years—all the roads and railways are regularly mined, all transport is accompanied by the military and has to move at a snail's pace while mine-detecting squads walk in front. Even the river Zambezi itself is no longer safe—FRELIMO now regularly destroys Portuguese patrol boats.

Portuguese strategy in the province is centred on defending the Cabora Bassa site—they have developed three concentric rings of defence whose only real effect is to tie down 30,000 Portuguese troops (40 per cent of the entire army in Mozambique), rendering them immobile while FRELIMO moves virtually unhindered through the rest of the province. FRELIMO has, of course, no intention of launching a suicidal frontal assault on the dam—instead Cabora Bassa is being slowly strangled as FRELIMO's paralysing grip on the transport system tightens. The difficulties of supplying Cabora Bassa have become so immense that the Portuguese have taken to flying cement to the dam site. And even if Cabora Bassa is finally completed the Portuguese will then have a new headache in the form of the transmission lines—1,400 kilometres of them—needed to carry the power to South Africa. These lines are

planned to run through the western part of the province of Manica e Sofala. But FRELIMO has been operating militarily in this area since July 1972, and the Portuguese army cannot possibly undertake to guard every yard of transmission line from guerrilla attack. Even if the lines were to be re-routed through Rhodesia, the recent upsurge of guerrilla activity in the north-eastern part of that territory gives no assurance that they will be any safer there.

Finally, what is Cabora Bassa? To the Western business men it is just a hydro-electric project, something to invest his money in and make himself a little richer. But to the people of Mozambique in the words of Sharfudine M. Khan, FRELIMO representative in New York, "Cabora Bassa is a crime. It is a crime not only against the Mozambican people, but also against the entire people of Southern Africa and of Africa as a whole." Its whole raison d'être is to entrench white supremacy in Southern Africa and the continued exploitation and degradation of the people of that sub-continent. For this reason FRELIMO is implacably opposed to the scheme, and deserves all our support in its struggle against Portuguese colonialism.

For further information contact: Committee for Freedom in Mozambique, Angola and Quine, Top Floor, 12 Little Newport Street, London WC2 (tel. 01-734 9541).

Polly Gaster

The Ord River

Man's massive disruption of the ecosystem of the Ord River Valley in NW Australia has brought unknown threats to human health. It may also bring to a halt the region's main industry of cotton growing. The Ord River descends 300 miles from the Kimberley Mountains and flows into the Gulf of Joseph Bonaparte, and its valley is one of the Australian population growth areas.

An irrigation and water conservation scheme, which involved the construction of a main dam (opened June 1972), was introduced into the valley by the former government. This has resulted in arbo-virus infections caused by the build-up of bird and mosquito populations on the increased water surface. A further problem is that of rapidly developing resistance of insect pests to DDT, with the risk of consequent

pollution owing to heavier and more prolonged spraying with insecticides.

A green grub, the boll worm (or weevil)—*Heliothis Armigera*—lived in native cotton and hibiscus plants. It lived in balance with its natural predators, the lace-wing fly, the lady-bird beetle and native wasps. Cotton growers introduced DDT spraying in the 1960s to limit boll worm infestation, but overlooked the fact that its natural predators would also be affected.

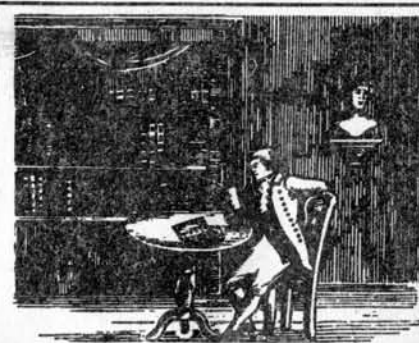
The latest figures show that 800,000 pounds of DDT plus 250,000 pounds of parathion (a powerful nerve poison) have been sprayed on the crops of the 9,000 acres of cotton in the area.

In the Ord region DDT is used on cotton only, and neighbouring sorghum fields which feed cattle for export are avoided. It could, however, leach through the soil back to the Ord River which supports many food fish and waters thousands of head of station cattle. Pesticides in meat would close the lucrative American market to Australian breeders. Experts have stated that the end of the road has been reached in the use of available insecticides which can be expected to work. The question now is whether biological control can take over in time to avert a catastrophe, or whether, with the crippling cost of spraying, together with loss of crops, the cotton industry will have to be phased out.

Already a minute parasitic wasp (*Trichogramma*) has been introduced into an experimental section of the plantation. The female wasp lays its eggs inside those of the boll worm, and competition for survival starts early. Two other biological control methods on which research is being carried out in the Ord area are the introductions of one or more of the viruses which infect the boll worm, and the planting of sorghum grasses in the fields. The boll worm will infect sorghum seed heads in preference to cotton.

The more direct hazard to human health is the rapidly spreading arbo-virus system. A bird is usually the host for several types of virus, including Murray Valley Encephalitis (of which there has already been one proven fatal case); Japanese B Encephalitis and Dengue Fever. The carrier is a mosquito, and mosquito breeding places have proliferated in proportion to the spread of irrigation.

E. M. Robertson



Books

Tomorrow's Humanists

BE HUMAN OR DIE: A STUDY IN ECOLOGICAL HUMANISM by Robert Waller. Charles Knight & Co. Ltd. £4.50.

Robert Waller is best known as a writer and broadcaster on agriculture. He wrote the life of Sir George Stapledon, the eminent scientist and ecological visionary, and for several years he edited the *Journal of the Soil Association*. Yet there is another Robert Waller, less well known: the poet, novelist and philosopher. It is in this role that he has spent much of his adult life grappling with the dilemma of modern man.

Be Human or Die is a kind of distillation of his philosophical position, based on his own experience and supported by sharp observation and analysis. He traces the development of humanism from the inhumanism of the medieval church, through the Age of Reason and into modern times. He argues that throughout our history we have been obsessed with an idea of "the universal state". Thus the early church and, more recently the communists, have sought to impose social forms based on an assumption of the infallibility of their founders and a monopoly of the truth. Enforcement was necessary because had the new forms spread by the consent of the people, changes could not have been realised within the lifetimes of those most anxious to realise them. In both cases the ardent followers have distorted the teaching of their leader and the ethical basis of the teaching has changed. Western Europe and the United States are equally trapped in their own view of themselves as

"leaders of progress". The inhumanism arises, says Mr Waller, from the too-willing acceptance of the Cartesian proposition. He would turn it round: "I am, therefore I think". Behind the thinker there is a human being with feelings and intellectualism needs to be humanised. Rodin's statue of The Thinker appears on the book's jacket, and Mr Waller cuts him down to size.

From it all there emerges the need for a new ethic based on the right of each individual to be himself and to participate in decisions made by his society. We must abandon the popular notion that no problem is insoluble so long as it can be stated in vast global terms suitable for consideration by the leaders of a vast, global society. We must consider people, their needs and aspirations and to do that society must be scaled down, or humanised. It is close to the anarchist ideal, but its idealism is tempered by the very real need to provide ourselves with the maximum flexibility as we move through difficult times.

I believe that in *Be Human or Die*, Robert Waller has written a work of major stature, a critique of modern society that may be compared with the writings of J. S. Mill. I have no way of knowing whether it will be read, or what influence it may have, but it will be of interest and value now to everyone who has ever felt the slightest doubt about the wisdom of industrial man, and it should be compulsory reading for all politicians, economists and industrialists.

Michael Allaby

Men's Environmental Predicament

AN INTRODUCTION TO HUMAN ECOLOGY IN TROPICAL AFRICA, by D. F. Owen. Oxford University Press, 1973. Boards edition £3.50, paperback 90p.

To write any introduction to human ecology in Tropical Africa is a formidable task but Professor Owen has managed to produce a book which is not only extremely readable and captivating but is highly informative as well. No sincerely written book on tropical Africa could fail to depress; mismanagement, and the destruction of a well-balanced ecosystem together with

disease and malnutrition are basically what development has done to Africa and Professor Owen makes no bones about it. Rather the reverse, he leaves one with the impression that little man has done to tropical Africa over the past few thousand years has been of any great advantage, either to himself or to the environment. In fact a study of the few primitive tribes left in Africa, the Mbuti Pygmies or the Kalahari Bushmen, for example, indicates that they of all people have found a satisfactory balance of exploiting their environment without in any way damaging it. "It could also be questioned," says Owen, "whether hunting and gathering are savage occupations: both require considerable skill, in many ways more skill than is required by the cultivator who is simply using the results of trial and error selection of crops. The chief effect of cultivation is that the carrying capacity of the land is increased and it is becoming questionable whether this represents an advance".

Nevertheless development has occurred and huge tracts of land have been cleared for plantation and for animal grazing. Professor Owen discusses the consequences for man, beast and the environment of such changes. What emerges from his analysis makes good sense. Thus the way to overcome pest problems (the Africans don't seem to mind their crops being ravaged by insects as much as Europeans do) is not necessarily to embark on an expensive and often futile campaign of pest eradication by chemicals, or even by the pest's biological enemies but to diversify crops to the point where pests can no longer get a foothold.

The way to overcome diseases such as malaria is not necessarily through campaigns to eradicate the vector (and Owen points out that the increasing use of fish ponds has given the mosquito a new habitat) nor to put the victim on anti-malarial drugs; instead he suggests letting children build up their own natural immunity to the disease. It is true of course that the ability of a child to resist malaria depends on his nutritional status and malnutrition throughout tropical Africa has become a key problem. Owen also dares to suggest that the Tsetse fly and sleeping sickness do have their benefits. "In view of the damage caused by the cattle to the savannah grassland," he says, "it may be that in the long run

trypanosomiasis has slowed down the destruction of the environment".

Population increase and poor nutrition loom as two intractable problems over Africa. The usual panaceas proffered are increased development and a greater commitment to technology and industry. What Africa needs, and Professor Owen implies it, is a complete turnabout—away from the circular thinking of the westernised industrialist and back instead to the concept of a highly diverse way of life involving the redevelopment of different cultures and lifestyles. To have any future Africa must repudiate any attempts to impose a monoculture system whether in life style or in agriculture.

Peter Bunyard

Nature in the Balance

ALASKA AND ITS WILD LIFE by Brian L. Sage. Hamlyn. £2.50. NATURE IN THE BALANCE by Hartman, Norman, Triffett and Weiss. Heinemann Educational Books. £1.50. ECOLOGY—CYCLE AND RECYCLE by Grace Holden Kolvas. Oak Tree Press Co. Ltd. £3.15. THE SEAS AND THE OCEANS by C. F. Hickling and Peter Lancaster Brown. Blandford Press. £1.75. THE TSAVO STORY by Daphne Sheldrick. Collins and Harville. £3.25.

In *The Tsavo Story* Daphne Sheldrick tells the story of the founding and subsequent development of the Eastern part of the Tsavo Game Park in Kenya. The anti-poaching campaign which caused the total disruption of the Waliangulu people described by Roger Gomm in the *Ecologist* last month (Vol. 4 No. 2) is here explained by the wife of East Tsavo's first warden, David Sheldrick. Understandably Mr. Sheldrick's primary concern was to conserve the wild life already existing in this unpromising and arid scrubland, while he laid plans for improving water resources and overcoming the inherent problems of drought, fire and flood. It was a daunting task and those with hind-sight should not blame him if he over-reacted to first hand evidence of an enormous poaching organisation which reached out from the Waliangulu hunters through unscrupulous middle

men in Mombasa to merchants as far afield as India. For two years the anti-poaching campaign supported by the Game Department, the National Parks staff and the police, harried, hunted and imprisoned the poachers. The immediate results were seen as a triumph for conservation, but the long term effect was the total breakdown and destruction of the Waliangu culture and an unprecedented increase in the numbers of elephants both inside and outside the game reserves.

Much of Daphne Sheldrick's writing is honest and intelligent, and where she recognises that mistakes were made she is not afraid to admit it, but for one reader at least it is hard to forgive the muddled thinking that denounces scientists for a lack of emotionalism in their relationships with animals while summing up the anti-poaching campaign in this way: "The Waliangu particularly had been taught a very salutary lesson and practically every male member of the tribe had seen the inside of a jail." Tears pour down her cheeks when her pet wild animals die, but she feels no remorse over the virtual death of a people who, before the days of Tsavo, were, in her own words, "carefree and optimistic".

Alaska and its Wild Life raises the same kind of unease about modern man's relationship to his environment. Bryan Sage is an ecologist employed by B.P. to assess the ecological impli-

cations of oil developments in Alaska and the trans-Alaskan pipeline.

Mr. Sage seeks to defend the oil men by attacking the foresters, the Atomic Energy Commission and the Yukon river dam; but he believes that it is possible to achieve a satisfactory balance between conservationists and developers by bringing them round a conference table. The whole issue, as he says, is charged with emotion. If his own solutions seem unlikely to succeed at least this well produced and finely illustrated book will not have been written in vain if it alerts a few more thousand people to the destruction that threatens this beautiful area.

The popular idea that the resources of the oceans are inexhaustible is slowly giving way to an understanding of the enormous amount of damage sustained by marine life through the greed and ignorance of mankind. Already huge areas of the world's richest fishing grounds have been fished out; the great whales have been slaughtered to the point that their pursuit is no longer economically viable; pollution is manifest on a global scale and even in remote antarctic waters marine life shows a dangerously high concentration of man-made toxic wastes. Understanding of this situation cannot of itself eliminate the thoughtless greed of nations, as manifest by the UN refusal to ratify the world moratorium on whale hunting passed at the Stockholm Conference in June

1972, but constant pressure and re-iteration of hard facts from the well informed is part of the process that does in the long run force governments to take a closer look at those threats. *The Seas and Oceans* by C. F. Hickling and Peter Lancaster Brown is a compact, thorough and well illustrated guide to the hydrosphere, full of the essential scientific information that those who seek to pressure governments must have. It is an invaluable contribution to a wider comprehension of the ecology of the oceans, the origins of life, the feasibility of tidal dams and very much else. I would like to see this book in every school library for we must make sure that the generation now growing up realises the destructive power of modern technology.

A book which must have been produced with this idea in mind is *Ecology, Cycle and Recycle* by Grace Holden Kolvas, an American writing for American secondary school children. Unfortunately the whole book depresses with its echoes of old fashioned text books like those that made geography one of the most boring of school subjects. This book totally fails to catch the imagination at any level and is calculated to strangle the interest of all but the most dedicated child. The coloured photographs are messy and lifeless, the captioning is poor, and the diagrams are dull. Only in the last chapter, which should perhaps have come first, does the subject begin to come to life, but this isn't good enough.

From Australia we get *Nature in the Balance* by H. F. Hartman, N. Norman, A. Triffett and D. E. Weiss, published in this country by Heinemann Educational Books. This unpretentious book is a much better introduction to the subject of ecology. The text is authoritative and straightforward, the diagrams are thoughtful and to the point, and where photography is used it is significant. The authors are all chemists working in Australia on various aspects of air and water pollution, and their aim is to present the background—ecological, economic and social—against which solutions to pollution must be sought. Where the American book turns ecology into just another "boring science" this book appeals to the young reader as being about the fundamental situation of which he is a part.

Ruth Lumley-Smith

This month's authors

George Woodcock is Professor of Canadian literature at the University of British Columbia. Penguin's have just published a new edition of his book *Anarchism*.

Urie Bronfenbrenner is Professor of Psychology and Child Development and Family Studies in the College of Human Ecology at Cornell University. He has also worked at the Institute of Psychology at Moscow.

Allan Rodger is Senior lecturer at the department of Architecture at Edinburgh. In 1968 he took up a post as senior lecturer in Architectural Science at the University of Khartoum.

Richard Westlake attended the Royal Agricultural College Cirencester. He is now a land agent.

Understanding Wildlife

WILDLIFE ECOLOGY: An Analytical Approach by Aaron N. Moen. W. H. Freeman and Co., San Francisco, USA and Reading, England. 1973. £7.60.

We are unfortunately rapidly reaching the point where much of wildlife is only able to survive in areas which man, in his generosity, has set aside from industry and agriculture. If any wildlife is to survive it has therefore become essential to study its basic ecology and it is amazing how little we know. Indeed, Professor Moen's book is probably the first textbook to deal with the basic nutritional and energy relationships of wild animals.

His analysis of wildlife ecology is based largely on studies of white tailed deer, but his concepts are applicable to all organisms. He builds up a full picture of the organism in its environment and stresses the use of models in this understanding. Computers, however, need quantitative data and it again reflects our poor state of knowledge of wild animals that Moen has to use domestic animal data to construct models. Clearly organism and environment are far too complex to be modelled accurately, but models can provide important information on the relative importance of the many variables involved in a relationship, and the shortcomings of any model help to clarify our understanding of the real world.

In 1960 Dasmann and Mossman demonstrated that a 50 square mile farm in Rhodesia could produce 120,000 lb of game meat per annum, as opposed to only 95,000 lb of cattle meat per annum; to the farmer this could mean a net profit of £3,000, while he would get only £500 for the same 50 square mile area under cattle. The successful practice of game ranching still needs far more information on the habits of wild animals to continue and to spread to other parts of the world; mankind has thus a rare opportunity of making a profit and of coexisting with Nature to his lasting benefit. Professor Moen's work is a valuable contribution towards the realisation of this opportunity, a step in the right direction, as well as an interesting experience in its own right.

Nicholas Polunin

The Exploitation of Food

World Food Resources by Georg Borgstrom. Intertext Books. 1973. £1.80.

One would have to be an extremely self-centred ostrich-like person to read Professor Borgstrom's latest book and not be deeply affected by it. In *World Food Resources* Borgstrom may have kept his tone more moderate than in his previous book *Too Many* but through well-documented facts he has still managed to reveal some exceedingly unpalatable figures about the flow of food from the non-industrialised struggling nations of the world into the pampered stomachs of the affluent west. Thus western Europe needs several times its own land area for food production; that land area being found mainly in the third world. Through its "ghost acreages" as Borgstrom calls them, Europe receives two million tons of protein for its livestock. Indeed Denmark—acclaimed for the quality and productivity of its agriculture—receives as much as 250 lb of protein per person per year from outside sources.

There was a time not long ago when western agronomists and FAO experts believed the agriculture of the industrialised countries to be superior to almost anything found in the third world (they seem to have forgotten the pre-history origins in the Middle East, Central America and the Far East of all the major crops and livestock). The past year, during which western countries have had to face not only shortages of imports but escalating prices has revealed the fallacy underlying the high-yielding agriculture of the industrialised nations. Moreover the main exporters of food are learning all too quickly that the industrialised nations can be held to ransom for food just as the countries belonging to OPEC have learnt to ransom their oil. Without fuel and food the west will be unable to maintain any pretence to its present life style. Both its agriculture and feeding habits will have to be modified drastically.

What makes Borgstrom's book particularly depressing is that he sees no easy solution, although he does point out that a considerable quantity of food—perhaps one-third—is lost through spoilage brought about by

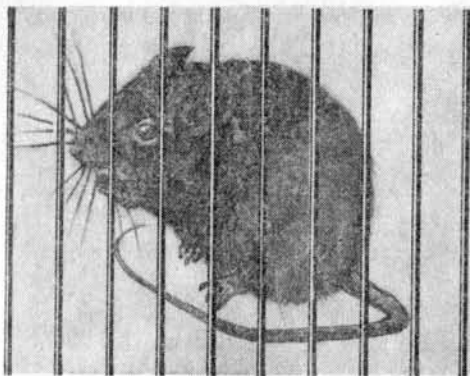
poor storage and grossly inadequate distribution. Nowhere in *World Food Resources* does he discuss the possibility that agricultural productivity could perhaps be enormously enhanced if only farmers could be persuaded away from monoculture and the growing of cash crops to a polyculture subsistence system based on extensive hand methods of cultivation. It is a direction which both Borgstrom and the world's agronomists appear unfortunately to ignore. Peter Bunyard

Health from Herbs

GRANDMOTHER'S SECRETS, HER GREEN GUIDE TO HEALTH FROM PLANTS by Jean Palaiseul. Translated from the French by Pamela Swinglehurst. Barrie & Jenkins. £3.25.

Jean Palaiseul's dictionary of medicinal plants *Grandmother's Secrets* is a gift for those increasing numbers who distrust modern medicine and its dependence on synthetic drugs. It is a good guide to the processes used in making medicines from plants and gives exact recipes for each remedy. Where perhaps it fails is as a reference book for an anxious parent wondering what leaf to boil or root to grind for Johnny's boils. Along with the index of plants he should have provided an index of ailments. However, let us not be churlish, this is a charming book full of peasant wisdom. In the doom laden future how comforting to know that we have only to cultivate the humble leek to have a panacea for almost all conditions. The leek, we are told, "provoketh urine and maketh healthy bowels" relieves infant diarrhoea, diabetes, gravel, colds, coughs, whooping cough, bronchial pains and engorgement. Can be given to a child that has swallowed a needle or a nail (the fibres sheath the offending object rendering it harmless until it is expelled in the normal way). Can be used externally for bee and wasp stings, itching, corns on the toes and soles of the feet, for abscesses, boils, carbuncles and whitlows; for pleurisy and cramp; and finally can be used to make an infusion for cleaning pictures, mirrors and windows which will also dissuade flies from settling thereon.

Ruth Lumley-Smith



Journal Review

Food production and the energy crisis

D. Pimentel, L. E. Hurd, A. C. Bellotti, M. J. Forster, I. N. Oka, O. D. Sholes, R. J. Whitman, *Science*, 182 (4111) 443 (1973). Detailed analysis, using maize as a typical crop, shows our agriculture to be highly dependent on energy supplies. Thus, in the USA in 1970 the equivalent of 80 gallons of petrol was required to produce every acre of crop. Every 100kcal of calorific value of crop obtained required the expenditure of 35.5kcal of energy, including 9.7kcal for petrol consumed and 12.9kcal to produce synthetic fertilizer. "Green revolution" agriculture, the "hope" of the Third World is also highly dependent on energy sources, particularly in the production of synthetic fertilizer and pesticides. The prospects for feeding the world at a time of high energy supplies are not bright unless a reduction of energy input needs (eg replacing mechanisation and synthetic fertilisers by manpower and natural fertilizers) is implemented.

Third World Attitudes

S. Lal, *Atmospheric Environment*, 7 (12) 1217 (1973) This provocative paper criticises the analysis of global environmental problems advanced by many in the West. For Dr. Lal the world is not over-populated, it is under-developed. World problems are at root political and economic and attempts to reduce them to a neutral 'scientific' form constitute deception.

Open Government

D. Hughes, *Marine Pollution Bulletin*, 4 (10) 147 (1973) Hughes reports that in Victoria (Australia) microfilm copies of industrial 'Licence to Discharge Waste' applications are available for public scrutiny and photocopies may be purchased also.

Volcanoes or Man; which pollutes more?

R. E. Stoiber, A. Jepsen, *Science*, 182 (4112) 577 (1973) Observations on volcanoes in Central America indicate that they release to the atmosphere 1,000 tons of Sulphur dioxide daily. This suggests an annual emission of at least 10 million tons of Sulphur dioxide from volcanoes worldwide. Man, however, produces ten times more than this.

Lead contamination record embedded in lake sediments

E. A. Crecelius, D. Z. Piper, *Environmental Science and Technology*, 7 (11) 1053 (1973) Analysis of lead levels at various depths (and of various ages) in the sediments of Lake Washington, Seattle, USA exhibit a sharp twenty-fold increase over the past 80 years. This mirrors the increase in human activity (specifically the construction of a smelter and automobile use) in the area.

Parameters of technological growth

C. Starr, R. Rudman, *Science*, 182 (4110) 358 (1973) Technology is a man-made resource to which, unlike natural resources, there is no finite limit. An analysis of the growth of our major technological capabilities to date indicates that technological growth is exponential. More optimistic conclusions are reached if this finding replaces the assumption of non-exponential growth of future technology used in "The Limits to Growth".

Instrumentation for Air Pollution Monitoring.

C. D. Hollowell, R. D. McLaughlin, *Environmental Science and Technology*, 7 (11) 1011 (1973) Two Berkeley scientists survey the wide range of devices available commercially in the US for the measurement and recording of air pollution levels. A fuller technical report is given in "Instrumentation for Environmental Monitoring: Air", LBL-1, Vol. 1 (1972) from the Technical Information Division, Lawrence Berkeley Laboratory, Berkeley, California 94720, USA.

Pollulan

Chemical and Engineering News, p. 40, Dec. 24, 1973. Pollulan, a transparent biodegradable plastic produced from starch by a yeast is under investigation in Japan's Hayashibara Biochemical Laboratories. It is environmentally superior to other plastics and is non-toxic. In its crude form it can even be used to make bread.

Why are London children so disturbed?

M. Rutter, *Proc. Roy. Soc. Med.*, 66 (12) 1221 (1973) Professor Rutter's comparison between 10 year old children on the Isle of Wight and in an inner-London borough, shows that London children exhibit more psychiatric disorder.

In London, also, a higher proportion of families are discordant and disrupted, more families live in unsatisfactory overcrowded accommodation and schools show a high rate of turnover in staff and pupils. This paper presents preliminary findings only. However, "it seems that it must be something about life in an inner London borough which predisposes to deviance, discord or disorder".

Roadside Pollution

C. D. Gish, R. E. Christensen, *Environmental Science & Technology*, 7 (11) 1060 (1973) Lead and nickel (from petrol) and zinc and cadmium (from tyres and motor oil) have been measured in soils beside two US highways. Pollution levels were greater nearer to the road and at locations where traffic volume was higher. Earthworms

accumulated up to 331ppm lead and 670ppm zinc, and were potentially lethal to animals or birds eating them.

Water Pollution and Detergents

C. B. Murphy, *Science*, 182 (4110) 379 (1973) The total inorganic phosphate content of Onondaga Lake, New York State, has markedly decreased in the 1½ years since local legislation limiting the phosphate content of detergent has been in force. Biological changes, including the elimination of blue-green algae from the lake, are noted. The prospect for controlling eutrophication is good.

Choose your pollutant

D. Shapley, *Science*, 182 (4110) 368 (1973) Shapley reports concern in the US that the catalytic converters designed to reduce automobile exhaust pollution by cutting down hydrocarbon and carbon monoxide emissions may also generate unacceptable quantities of sulphuric acid mist.

Effects of coal smoke pollution on grass

J. K. A. Bleasdale, *Environmental Pollution*, 5 (4) 275 (1973) Smoke polluted air has been found to reduce the growth of S23 ryegrass by 16 per cent to 57 per cent (weight basis). However, no abnormal leaf lesions are produced. The culprit is probably sulphur dioxide.

Cigarette pollution

R. J. Naumann, *Science*, 182 (4110) 334 (1973) A cigarette smoker may not only pollute his own lungs, but also those of others. It is calculated that in a typical office (40 cubic metres) a cigarette smoked in 4 minutes will elevate the count of tar particulates to 36 times that considered safe according to US clean air standards.

The Human Impact of the Managua Earthquake (Nicaragua, 1972)

R. W. Kates, J. E. Haas, D. J. Amaral, R. A. Olson, R. Ramos, R. Olson, *Science*, 182 (4116) 981 (1973) A detailed analysis of the immediate social response to the Managua disaster points to the amazing resource provided by the strength of the extended family system. In contrast, the inflexibility inherent in the city culture of a Los Angeles or a San Francisco does not augur well should a major earthquake strike the west coast of the USA, as it probably will "within the lifetime of most readers of this article".

Seaweeds

K. H. Mann, *Science*, 182 (4116) 975 (1973) The edge of the sea constitutes one of the best habitats for plant growth in temperate latitudes. Kelp growth may be rapid even in winter with water temperatures close to 0°C. Kelp forests sufficient for commercial harvesting occur widely in both hemispheres.

The disposal of Nuclear Wastes

A. S. Kubo, D. J. Rose, *Science*, 182 (4118) 1205 (1973) A survey of possible means of storing radioactive nuclear waste. The authors find several attractive technological options which have been given too little thought. They urge that a workable ultimate disposal scheme be developed soon.

World Population in 1973

J. A. Loraine, *The Lancet*, p. 22 (5 Jan 1974) A useful brief survey of the World Population situation. Between mid-1972 and mid-1973, the World's population grew by 80 million, a number in excess of the combined populations of France, Belgium and the Netherlands. At this rate, the World's population would double in 35 years. Dr. Loraine concludes "the views of those who wrote *The Ecologist's* 'Blueprint for Survival' and 'The Limits to Growth' were vindicated and during 1974 we shall see throughout our planet the first faltering steps to a more sustainable form of society".

Long-Term Effects of Air Pollution on Health

WHO Chronicle, 28 12 (1974) A description of research in progress in a number of countries to assess the health risks associated with long-term exposure to atmospheric pollution.

Long-Term Occupational Exposure to DDT

E. R. Laws, W. C. Maddrey, A. Curley, V. W. Burse, *Archives of Environmental Health*, 27 (5) 318 (1973) Extensive medical inquiries, liver function tests and DDT serum levels were recorded for workers exposed occupationally to high levels of DDT (90 to 450 times the exposure of the general population) daily for periods averaging 21 years. No evidence of liver disease or liver function abnormalities was detected. Experimental work with animals had indicated previously that the liver might be particularly susceptible to damage by DDT.

Pollution Studies in the Clyde Estuary/Sea Area

J. H. Steele, A. D. McIntyre, R. Johnston, I. G. Baxter, G. Topping, H. D. Dooley, *Marine Pollution Bulletin*, 4 (10) 153 (1973) A preliminary government survey of the physical and biological character of this body of water with particular reference to the effect of pollution on fisheries. Levels of copper, cadmium, zinc and lead in fish, plankton, sediments and water are given plus some data on organochlorine pesticide that there is no evidence that the levels of contamination of fish or shellfish flesh present a hazard to human health. However, levels encountered are likely to have an effect on the hatching of fish eggs and the survival of fish larvae.

International Scope of Marine Pollution Damage

D. P. Tihansky, *Marine Pollution Bulletin*, 4 (10) 149 (1973) A useful summary of the present situation.

Uptake and Loss of methylmercury in Fish

W. D. Burrows, P. A. Krenkel, *Environmental Science & Technology*, 7 (13) 1127 (1973) The direct uptake of methylmercury pollutant from the ambient water by bluegill fish was recorded. Uptake was not complete and extended over several weeks. Levels were highest in liver and kidney. On being transferred to clean water, fish showed loss of methylmercury, rapidly at first (~1 month), then more slowly.

Japan

J. W. Bennett, S. Hesegawa, S. B. Levine, *Environment*, 15 (10) 6 (1973) A summary of the pollution/resource crisis in Japan.

The hydrogen economy

C. A. McAuliffe, *Chemistry in Britain*, 9 (12) 559 (1973) Hydrogen, generated from water, offers an attractive non-polluting alternative to fossil fuels as a source of energy. Aspects of the production, distribution and use of hydrogen as a fossil fuel substitute are discussed. Of course, energy is required to generate the hydrogen initially.

Methylated arsenic in the environment

R. S. Braman, C. C. Foreback, *Science*, 182 (4118) 1247 (1973) Methylated forms of arsenic have been detected in natural waters, bird egg shells, sea shells and human urine. Information on the effect of these compounds in natural ecosystems is needed.

The effects of PCBs on 3 species of phytoplankton

N. S. Fisher, C. F. Wurster, *Environmental Pollution*, 5 (3) 205 (1973) PCB pollutants inhibit the growth of two species of marine diatom, even at very low concentrations (in one case at 0.1 parts per thousand million). A species of marine alga studied was not affected. The ecological consequences of such effects should be investigated.

Mercury in wading birds

J. L. F. Parslow, *Environmental Pollution*, 5 (4) 295 (1973) Total mercury levels were determined in the livers of wading birds collected throughout the period August—March in the Wash (presumed unpolluted). Results show that mercury accumulates ten to twenty-fold during the winter months (temperate estuarine environment) and is eliminated in the summer (arctic breeding grounds). This suggests that mercury in polluted estuaries may pose a special threat to waders.

Lead in the California Sea Lion

H. W. Braham, *Environmental Pollution*, 5 (4) 253 (1973) Previous studies have shown that this carnivorous marine mammal accumulates high concentrations of DDT, mercury, cadmium and silver. This paper shows that it also accumulates lead above natural levels (ranging from 0.3ppm in fat (dry weight) to 34ppm in the humerus bone). Lead levels are comparable with those observed in man.

Cost analysis for air pollution

P. M. S. Jones, *Atmospheric Environment*, 7 (12) 1191 (1973) On the basis of experience gained with a Department of Trade and Industry study, the author summarises the many problems involved in attempting to quantify as a cost the environmental damage caused by air pollution. "How, after all, is one to set a figure to the value of the loss of utility of the individual and his family through suffering and premature death?" He even wonders "whether the effort involved in attempting to determine damage costs is worthwhile". However, even crude estimates provide a useful incentive for change and help to set priorities for action, he believes.

Domestication of pulses in the Old World

D. Zohary, M. Hopf, *Science*, 182 (4115) 887 (1973) The pea and lentil (protein-rich) are founder crops of Old World Neolithic Agriculture and were probably domesticated in the Near East along with wheats and barley (starch-rich) not later than the 6th millennium B.C.

Tropical agroecosystems

D. H. Janzen, *Science*, 182 (4118) 1212 (1973) A summary of the problems and needs of tropical agriculture. Ideas and policies generated in temperate zone countries have done little to help and much to harm tropical lands.

Environmental priorities

W. S. Broecker, *Science*, 182 (4111) 435 (1973) Broecker draws attention to the fact that although billions of dollars are spent on pollution control in the US, almost nothing is spent on research devoted to a basic scientific understanding of the ecosystem pollution control is designed to save. The reason—the straight-jacket of compartmentalised institutional responsibility.

Vasectomy—long-term effects

Science, 182 (4115) 946 (1973) Two letters in contradictory tone from Alexander (Oregon) and Sackler (New York) in response to an earlier publication on the subject (*Science*, 179 293 (1973)) which indicates "the need for caution and extensive investigations in man before recommending vasectomy as a simple, innocuous 'physiologic' means to ensure conceptual control". However, both correspondents agree that "the long-term effects of this procedure have not been completely determined".

Lead metabolism in the normal human

M. B. Rabinowitz, G. W. Wetherill, J. D. Kopple, *Science*, 182, (4113) 725 (1973) Approximately two-thirds of lead assimilated by a healthy man fed on a diet of normal lead content was of dietary origin. The rest was inhaled lead. Of the total assimilated lead, 8 per cent was absorbed into the blood and passed from there (mean life 27 days) to the urine (54 per cent blood lead), the skeleton and the soft tissues. The greatest accumulation of lead occurs in the skeleton, passing back into the blood only slowly (mean life in skeleton 10,000 days).

Absorption of cadmium, copper and zinc by dog whelks in the Bristol Channel

R. D. Senner, G. Nickless, *Nature*, 247 (5438) 198 (1974) Unusually high concentrations of heavy metals have been observed in the flora and fauna of parts of the Bristol Channel. This paper reports observations on dog whelks taken from an uncontaminated environment off the Dorset coast and introduced (April 1973) to an area off St Andrew's Head, North Somerset. Zinc levels were found to increase from 345ppm to 2,800ppm (dry weight) to match those of native whelks in two months, but cadmium levels increased more slowly (from 36 to 211ppm in 4½ months; native whelks 780ppm).



The Changing Climate

Sir,

Professor Bryson, in his article on the drought in the Sahel (October issue of *The Ecologist*), does a service by drawing our attention to the need to examine whether man's activities are partly or even largely to blame, but I wonder if he has really made out a case. His argument is that man-made increases during the last century in atmospheric turbidity and carbon dioxide content have caused increases in the mean values of the equator-pole temperature difference and the lapse rate, sufficient to shift the mean latitude of the North Atlantic sub-tropical anticyclone southwards by about half a degree, with the result that the ITD over West Africa has also shifted southwards far enough to decrease the annual rainfall over northern Nigeria by 10-14 inches. But no case has been clearly made to establish the magnitude of changes in equator-pole temperature difference or in lapse rate. Moreover, it is assumed that any such changes are caused only by changes in carbon dioxide concentration or turbidity, or both; other possible causes are not considered.

It would have been helpful to demonstrate the severity of the current drought, and to contrast it with others known to have occurred during the last hundred years. Even if we accept the temperature changes given by Professor Bryson, the argument is still doubtful in several places.

Firstly, the relation between the latitude of the subtropical anticyclones and the temperature gradients, both latitudinal and vertical (Fig. 3.), applies to a simple numerical model of the hemispheric circulation of the atmosphere. This model was admitted to be only an

early attempt on the part of Smagorinski's group, grossly oversimplifying the vertical structure and largely ignoring the effects of the hydrologic cycle. It would be more appropriate to use later versions of the model, improved to allow for condensation, precipitation, soil moisture accumulation, distribution of land, ocean and other factors which make the model more closely resemble real atmosphere.

Secondly, Fig. 2 appears to be based on *monthly* mean latitudes of the North Atlantic subtropical anticyclone and the ITD, and no evidence is given to support the implication that such monthly means (presumably controlled largely by monsoonal effects associated with seasonally varying temperature contrasts on a *continental* scale between land and sea—West Africa and Gulf of Guinea) are applicable to *annual* changes, claimed to be related to temperature gradients on a *global* scale. Using monthly mean latitude, Fig. 2 shows 1° latitude change in position of the anticyclone is equivalent to 3° for the ITD. For *annual* means, it seems that a 1° shift for the anticyclone is equivalent to $\frac{1}{3}$ ° for the ITD, if we take as the simplest assumption that year-to-year changes in the latitudes are in proportion to their means—say 35° for the anticyclone, and 13° for the ITD over Nigeria. This assumption might be tested using the most developed version of the general circulation model.

Thirdly, it is claimed that Ilesanmi's work shows a 1° latitude change in the ITD latitude corresponds to a change of 7 inches annual rainfall over northern Nigeria but, as Ilesanmi pointed out, this deduction is based on a *linear* relation between mean annual rainfall and the difference between mean ITD latitude and rain-gauge latitude. However, Ilesanmi's own figures clearly suggest a *curvilinear* relation, and he admitted the likely unreality of the linear relation. For places with an annual rainfall about 28 inches (i.e. northern Nigeria), a 1° latitude change would give about 2 inches change in rainfall. For 17–20° N, where annual falls are 2 to 10 inches (more characteristic of areas affected by drought), 1° latitude change may well be equivalent to only 1 inch change in rainfall, or even less.

Thus, the second and third points each give effects an order of magnitude less than those claimed, together resulting in changes in rainfall of order 0.1

inch (for the $\frac{1}{2}$ ° change in latitude of the Atlantic anticyclone) attributable to the mechanism proposed by Professor Bryson.

D. E. Pedgley,

Overseas Development Administration,
Centre for Overseas Pest Research,
College House,
Wrights Lane,
London W8 5SJ.

Sir,

Having recently been involved in entomological and ecological studies in preparation for long-term control operations against human onchocerciasis ("River Blindness") by several United Nations agencies in the savanna regions of West Africa, I was particularly interested to read the article *Drought in Sahelia: Who or What is to Blame?* by Reid A. Bryson in your October number.

However, the article includes little information on Africa itself, and this raises several basic questions within the article's own context.

Firstly, to what extent is the basic premise a real one, i.e. that climatic patterns have really shifted? Because a fifth year of drought in "Sahelia" (which in fact is part of a vegetation zone, the Sahel savanna or steppe, extending across to the east coast of Africa) has coincided with one year of north-tropical drought of much larger extent, does it necessarily follow that a long-term inter-tropical shift of rain-producing systems is needed to account for the "Sahelian" drought? Allowing for expected rainfall variance from year to year, I cannot avoid the suspicion that the implications are no more global than Professor Bryson's argument is circular! In any event, such hypotheses are worthwhile provided they are open to testing: have there been areas which have received *more* rainfall than expected, following complementary trends explicable as a result of this postulated shift? What of the southern savannas of Africa? What of North Africa?

Secondly Professor Bryson states: "Tropical temperatures have hardly changed." This point seems essential to his argument. Yet we have detailed evidence of glacier retreat during the present century on the high mountains of East Africa to tell us otherwise. This of course applies to effects at some 4 km in altitude and interpretation is therefore difficult, but Professor

Bryson's statement on this matter is clearly inaccurate.

On the matter of atmospheric turbidity and CO₂ content Professor Bryson seems to assume that all the major sources lie outside Africa. In "Sahelia" itself, however, there is the Harmattan, a dust-laden north-easterly wind blowing from the Sahara which at its densest can reduce visibility to a few feet, and which must have profound effects over much of West Africa. Is this not a turbidity variable which needs to be taken into account? And what of grass fires, by which I mean not merely a part of the "slash-and-burn" agricultural practices mentioned in passing in the article, but the spectacular annual burn over a high proportion of the inhabited African savannas? The smoke (not forgetting CO₂) which they produce is often well beyond present-day tolerance levels for the industrial north, and for weeks on end one's eyes smart and the sun may be reduced to a red (and infra-red) blob in the sky, even at mid-day. This can hardly be an insignificant variable.

When Professor Bryson concludes "Our climatic data for the Sahelian zone is (sic) rather scanty and our knowledge of the monsoons inadequate", he may be admitting to more than he intends. Gross data on fluctuations in the level of Lake Chad and on discharge rates of the upper reaches of the Niger, the Red and Black Volta and other rivers, for example, must provide figures to indicate recent patterns of climatic variance. There is a notable absence in Professor Bryson's article of any reference to literature in French, while nearly all of his "Sahelia" lies in francophone Africa. Moreover, a detailed body of synoptic meteorological data concerning Africa is kept under constant review by, among others, the Centre for Overseas Pest Research (formerly the Anti-Locust Research Centre) in London. It seems to me irresponsible to argue a one-sided and incomplete case implying that global air pollution by the industrial nations of the northern hemisphere is primarily to blame for "Sahelia's" present plight, with the rider that the situation can therefore only be expected to deteriorate. If taken seriously, this would discourage practically any feasible action on the spot. And if the argument should be wrong owing to failure to take into account even the available meteorological data,

judgement of the article must be more severe.

A. W. R. McCrae,
Hope Department of Entomology,
University Museum,
Oxford OX1 3PW.

Dr Bryson replies

Sir,

I must reply to Mr McCrae's comments with an initial statement that for humanitarian reasons I *hope* my analysis of the Sahelian climatic situation is incorrect. However, I do not find any consolation in his comments, for they contain little evidence that it *is* incorrect.

Probably the most important question raised by Mr McCrae is that of whether climatic patterns have really shifted. Evidence has accumulated over the past decade that makes abundantly evident the fact that the climate has changed. This does not, of course, prove that the climate will continue to change, but changes such as we have seen in the past three decades have not reversed in less than three or four decades, according to the evidence we have available from the past. Prudence would seem to require that we at least consider the possibility that the present state of the atmosphere will continue for some time. To be sure, there is a variance of rainfall from year to year, but this variance is superimposed upon longer term trends. For West Africa, this is illustrated by Figure 1, obtained by fitting Ilesanmi's (1971) model to the actual rainfall of the Togo-Dahomey area.

That there are significant trends is amply demonstrated by the work of Lamb (1966), Winstanley (1973), Mitchell (1972), Dronia (1973), and many others. To be sure, the glaciers of the high mountains of Africa did retreat in the present century, as Mr McCrae tells us, but this century has seen both average hemispheric warming and cooling, and before the glacier data can be applied to the question, they must be corrected for lag and put into the proper time and space context. That the tropical temperatures are indeed less variable was shown in the SMIC report (1971, figure 3.8). Indeed, that report suggests a slight tropical warming in recent years while the high latitudes cooled.

Most disturbing is Mr McCrae's question as to whether there have been areas of increased rainfall explicable

as a result of the postulated shift. One would expect that a writer sufficiently informed on the subject to be critical would have read Winstanley's paper (op. cit.) and be aware of the increased rainfall on the northern fringe of the sub-tropical highs which corroborates their southward shift and the expansion of the circumpolar vortex.

If Mr McCrae had read my other works he would be aware that I have not on any occasion assumed that Africa was not a major source of particulates (e.g., Bryson and Wendland (1970), which shows Africa as a dominant source and specifically refers to the Harmattan). I would be glad to include grass fires with "slash-and-burn" as a significant source. Indeed, a common thrust that is responsible for global pollution.

The above points might be argued further, but there is one accusation that Mr McCrae makes that is totally unjustifiable. He says it is "irresponsible to argue a one-sided and incomplete case implying that global air pollution by the industrial nations of the northern hemisphere is primarily to blame for 'Sahelia's' present plight." It seems to me irresponsible of Mr McCrae to read an article superficially, then be critical of it. At no point in the article is it implied that industrial nations are the prime cause of increased turbidity. That is found only in the editorial introduction. At several points in the article, I clearly said "If this analysis is correct...", and indicated that there might be other factors that I neglected.

R. A. Bryson,

Director,

Institute for Environmental Studies,
University of Wisconsin-Madison,

All flesh is grass

Sir,

I hope I am tolerant and open-minded about other people's viewpoints: and certainly K. Jannaway of the Vegan Society (re: Letters, October 1973) has every right to believe that a non-meat diet is better for him. But when he, as other dedicated vegetarians, begin to defend their thinking on a pseudo-scientific basis with an almost religious missionary zeal—well, I suppose, at very least they weaken their own arguments to those "forward looking people" who may not share their views.

First he brings up that meat eating

is some addictive habit of the "affluent West". People wear clothing or they do not, but that doesn't make clothes-wearing an addictive habit; and people all over the world eat meat in every society and tribal collective, whether technologically "affluent" or not. People eat what is available. Their physiological construction allows them to cope with an omnivorous diet efficiently. "Affluence" gives them a greater choice (often abused) in what is available.

Jannaway goes on to assume that meat-eating became popular with people only after the Ice Age rendered great sections of plant life unavailable. How then does he explain pre-pleistocene fossils indicating a human physiological structure capable of processing an omnivorous diet?

Then Jannaway brings up the myth of "traditionally vegetarian India". When seen in its socio-economic perspective, such a statement is absurd. No culture in recorded history has ever been traditionally vegetarian. True, as populations increase, as economic divisions creates social class structures, numbers of people find a balanced diet difficult to maintain regularly. Sacred cows become sacred because there aren't enough of them to go around.

Surely if Jannaway approached the problem in his own "reasoning" rather than "rational" terms, he could not fail to see that modern affluent technological societies consume more meat than they need for balanced nutrition. But if Nature teaches us anything, it is that bio-processes function most efficiently in an atmosphere of moderation... not deprivation. Extremes of any kind are dangerous to maintenance and survival. Even if we examine the diets of our closest physiological relatives, the anthropoid apes, we find that chimpanzees not only eat but hunt meat. And gorillas, whose diet is vegetarian, possess species specific micro-organisms in their digestive tracts which convert plant food to a substance containing the forms of amino acids obtained only from meat proteins. When removed from their habitat and maintained on a purely vegetarian diet, the apes sicken and often die. This is because the micro-organisms cannot survive the move and the apes are no longer able to convert their food.

Finally, a word about the "repugnancy" of meat to Jannaway & Co. I put to you that if it is so "cruel" to

kill animals for consumption, if you are really going to follow that logically to its conclusion—why are you not concerned with the smaller members of the animals in the kingdom whose lives you may be upsetting or even destroying every time you pull a crop out of living soil. Or is that silly? Well, I mean where do you draw the line? Why is it any "kinder" to kill a micro-organism clinging to a carrot than a cow which has been bred for its beef? I once asked a vegetarian friend that and she replied, "We wouldn't kill them if we could avoid it... but then there wouldn't be anything left for *us* to eat". Exactly! In the marvellous food chain which has evolved with living organisms, the pattern is cyclical. Everything is killed and eaten—yes, even man (or have you forgotten who feeds the worms!). What other species *don't* do as a rule, is to kill themselves—and it is that quality of man which is repugnant to me, for there is no natural biological reason for inter-species murder. There are so many iniquities people have perpetrated on themselves and their environment. Cannot we concentrate our emotional energies to alleviate these instead of the "cruel and wasteful" interference in naturally evolved food chains and life processes.

Sincerely,

Beth Porter,
82 Neal Street,
London WC2.

Socialism versus ecology

Sir,

I believe the deeper import of the problem raised by Dr. Skolimowski's article in your February issue, my letter and your reply in your August issue, namely the proper relationship between ecology and ideology, warrants some further remarks on the subject.

You claim that the fact that American consumption—and, I might add, West European consumption, which is rapidly catching up—is too high to be enjoyed by everybody, is surely not an argument against egalitarianism but against American consumption.

I fully agree with your implied disapproval of excessive American consumption. It is to be regretted that all Westerners have not shared the beliefs of the Pennsylvanian Amish who are as you know opposed to machinery, among other reasons because they believe that "technology is a servant who takes over the house", to quote

Professor John Milen of Loyola University, Chicago. But it is too late to put the clock back. Eventual "progress" to consumption on the American level by the comparatively backward nations of the world is possible if given the time, while voluntary "regress" to the pre-industrialised level by the advanced nations is inconceivable. The only sensible thing we can therefore do, pending a halt to the population explosion, is to break the urge to repeat the American mistake instead of accelerating it by appeals to egalitarian escalation.

As for your objection to the "natural laws" I mentioned, I plead guilty to faulty expression of my idea, as a result of which it sounded as if I considered "everyone for himself and the devil take the hindmost" to be natural.

They are of course only the natural corollaries of the law of survival of the fittest. I can save myself an elaboration of the argument, since Mr. Boyden has had the foresight to do it for me in the same issue of *Ecologist*.

Since environmental resources are already overtaxed and there is nothing we can do about the existing number of people and since its rate of growth can at best be reduced only slowly, I believe there is a strong argument against propaganda for sharing, whether simple or not. Why awaken or whip up new appetites and wants, such as unpolluted virgin forests, or unspoilt beaches for everybody, which cannot be satisfied (except perhaps in Disneyland)? Revolutions of rising expectations should not be started before and unless the expectations can be satisfied otherwise they make people more rather than less unhappy.

Finally, I would like to stress even more than in my first letter, that I think Dr. Skolimowski's apparent faith in the beneficial effects of socialism on the diminution of the amount of material goods, is quite unjustified.

I am afraid Dr. Skolimowski's solicitude for the preservation of nature is chiefly due to the opportunity it offers to put in a plug for socialism, alias welfare, which have no business there. No ideology could be less compatible with the aims of ecologists and environmentalists than socialism. In this as in most other matters, one cannot have one's cake and eat it too.

F. C. Nano,
Can Vifor,
Pollensa.



Friends of the Earth

By the time this article appears in print we'll have a newly elected government. Writing now, a couple of weeks before the election, it seems that we're being asked to back one horse out of a selection of runners which are all blindfolded or at best blinkered and pointed in the opposite direction to even the starting post, let alone the finishing line. Take a look at the jockeys. Throwing mud at each other in a pitiful attempt to change the odds by influencing the punters. Look at their form. Run-out, tailed off, unseated its rider, refused at the first hurdle, fell. But the money must go somewhere and we can only influence the outcome by shouting from the stand.

But in all seriousness, whatever the outcome of the election, one thing can be certain. The government will be champing at the bit to get back on the path of economic growth as quickly as possible having learned nothing from a disastrous bout of shortages and crippling industrial and economic upheavals. If a formula for disaster was ever needed we've got it. It's inherent in our policies of haywire growth.

But just how do you dispel a myth

which has been the mainstay and the motivation for a whole philosophy for hundreds of years? How do you create a climate which can accommodate the change of attitudes and values so urgently necessary if we are to dodge the next crisis and the one after that? Governments only introduce distasteful legislative measures when there is seemingly no alternative or when the effects of such legislation can be dealt with in isolation. They are, in effect, in a cleft stick. To introduce long-term radical restrictive legislation on land-use, energy use, population growth and industrial expansion would be seen quite rightly as a rejection of the principles upon which capitalism is founded. Once you admit that there is a limit to growth, the carrot which has dangled so temptingly before the people of the "developed" western world, smartly disappears up its own roots leaving presumably, a disillusioned embittered population after someone's blood.

The trade-union movement in this and other countries has an enormous role to play with respect to this dilemma. It must be remembered that, despite the widely-held view that they exist solely to see the maximisation of job opportunities and wages regardless of environmental considerations, they have a very clear understanding of the issues. Their members are among those who are the first to suffer the evils and social repercussions of growth as well as its obvious benefits. They are, without a doubt, beginning to cast a very discerning eye at the future prospects of our teetering economy. From NCB officials to a coal-face worker in a South Wales pit the question is the same. Why the hell do we plan for

enormous increases in energy-use to the end of the century while yet being so wasteful of it?

It is the job, even the duty, of every trade union, in the light of the current economic climate, to think hard and long about the viability of the industrial future. If they exist to safeguard the interests of their members there can be no other course of action. The farm-workers have a duty to the country, as well as themselves, to raise such issues as land-loss, productivity and soil quality problems, all of which could have profound effects on food-availability within the next 20 years. The car workers must question raw-material availability, metal prices and market prospects if the industry is to remain a major bread-winner and source of employment for the UK. Teachers must be prepared to speak up on issues such as population and social conditions if we are really to come to grips with the problems in our schools. The miners, electrical workers and energy-related bodies should be willing to talk without bias about energy options.

If, in the rush and whirl of inflation, we lose sight of the facts behind the crisis and merely squabble about the consequences, we are in danger of losing both the battle *and* the war. The initiative won't come from any government blinkered by a commitment to European economic expansion, regardless of the toll it takes on the environment, social stability and reserves of resources. Initiative must come from the trade-union movement and the environmental lobby whose power base and expertise could form a formidable liaison in the very real fight for a viable, stable and harmonious future.

Peter Wilkinson

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A one-week course on the principles and practices of organic husbandry entitled

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has been arranged by The Soil Association and will be held at Ewell Technical College, from July 8th-12th 1974. The course fee is £18 which covers the cost of tuition, two meals per day, morning coffee and afternoon tea.

Further information from:

Dr. A. Deavin, Research Director
Ewell County Technical College
Reigate Road, Ewell, Surrey, England.

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This new course aims to show how the organizational and technical procedures of radiation protection can be applied to the broader field of Environmental Protection in line with the international trend towards a more unified approach to environmental pollution problems. Particular attention is paid to the environmental consequences of large scale energy generation by both nuclear and non-nuclear power sources. This course will provide a bridge between the physical sciences and the life sciences, and will emphasize the important contribution that physics studies in particular can make to the public health field. The course duration is a minimum of one year full-time, or two years part-time on a day release basis. The course begins each October, starting in October 1974.

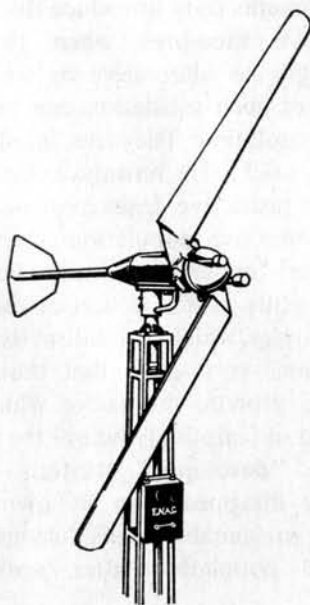
Further details from Dr W. B. Gilboy, Physics Department, University of Surrey, Guildford.

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Further details and application forms can be obtained from the Principal at the College

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PUBLIC INQUIRIES: Use us to present your objection to a planning inquiry at reasonable cost. We act as agent, find witnesses, research evidence, write copy for press releases and assist with overall campaign. Contact: Development Resources Management Ltd., 45 Queen Street, Edinburgh EH2 3NH. Tel: 031-226 4735.

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THE SUE RYDER FOUNDATION

Experienced Site Supervisors and Skilled Tradesmen (bricklayers, carpenters, plumbers, electricians, decorators, floor layers/screeders) required for work in U.K. and Europe, erecting homes and hospitals for sick and disabled, and renovating older buildings. Serious, preferably single, applicants. Insurance and maintenance provided. Remuneration by arrangement. Please apply to Appointments Secretary, Sue Ryder Foundation, Cavendish, Suffolk.

OPPORTUNITY for energetic and dedicated young man/gardener to help naturalist/publisher restore old garden and woodland beside the Wiltshire Avon. Must be passionate to learn about trees, plants, flowers. Some basic horticultural knowledge useful. Willingness to help domestically also helpful. Furnished service cottage with glorious view but unsuitable children. Please write with details to James Mitchell, Mitchell Beazley Ltd., 14/15 Manette Street, London W1V 5LB (Publishers of Hugh Johnson's *International Book of Trees*).

WHOLEFOOD SHOP: Young person sought to share shop duties, packaging, baking and book-keeping with four others. Experience not essential. Wages low; job satisfaction potentially high. Accommodation possible. Some possibility of joining partnership. Write outlining previous activities to Arjuna Wholefoods, 12 Mill Road, Cambridge.

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Support **THE DEFENDERS OF ESSEX**, The Chase, Paglesham East End, Rochford, Essex, who can provide you with car stickers, T-shirts, posters and active things to do.

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'ER BE A FOINE COUNTY. Come and enjoy a holiday in Devon. 4-berth caravans, from £9, April-October in a secluded countryside site. Centre for Bude, Clovelly, Dartmoor—ideal for the walker with tough boots. 10% discount F.O.E. Full details from: Ken Strong, 107 Station Road, Okehampton, Devon.

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LATE CLASSIFIED

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SITUATION VACANT: ASSISTANT MANAGER required **HEALTH FOOD SHOP** North of England which it is proposed to convert to Common Ownership. Not essential, but preferred that applicants should be able to invest to ensure dedication to whole food ideal. Must be vegetarian. Hard work. Apply fully Box PD31.

SITUATION VACANT: TEACHER NEEDED NOW for small class of maladjusted boys and girls at Home School in beautiful countryside. Personality more important than experience. Needed: warmth, tolerance sense of humour. Box PD33.

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Miss J. Booth,

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GIRL—18-25, intelligent, imaginative, rational, social conscience, physically fit, sought by young man of similar attributes who fears inevitable eco-catastrophe and desires companionship of attractive like-minded partner with whom to share happily the remaining years of industrial civilisation. No children desired of course. Perfectly serious. All letters answered. Box No. PD27.

TRADITIONAL COUNTRY LIFE—Young woman, non-smoker, single, 27, seeks friendship of bachelor, possibly craftsman? Interested in all aspects of the way people lived before the development of the "infernal" combustion engine and so on, who does not consider living without the convenience of so-called progress a retrogressive step. Please write to Box No. PD28.

COUNTRY COMMUNITY. Wish to meet other people with £5,000+ capital with eventual view to pooling resources to purchase large country property to set up a creative community with a more ecologically viable style of life. P.O. Box 163. Croydon CR9 0AB. Tel: 01-651 0513.—Miss M. A. F. Brown.

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WORLD POPULATION YEAR

A special organisation has been set up to co-ordinate WPY activities in Britain and a full-time office will open on 1 April. Called the **POPULATION ACTION GROUP**, it is a coalition of most of the organisations that worked on Population Day in May 1973, plus the World Development Movement—the support of other interested organisations is sought. Names of speakers for WPY, by region, will be available which will cover the coalition's member organisations. For further information, write: PAG, c/o Linda Starke, 23 Chilworth Street, London W2 3BD.

ENERGY CRISIS—real or contrived?

A conference organised by the Mid-Yorks branch of Conservation Society to discuss problems and possible solutions. May 18th 1974 2pm-7.30pm at Leeds Polytechnic. Admission 50p. Speakers: Dr. S. R. Eyre, Anthony Tucker, Professor R. S. Berry, Councillor R. Millett. Enquiries to K. Hudson, 27 Gordon Street, Wakefield.

FOR SALE: SHOP/HOUSE/WORKSHOP IN FROME, SOMERSET. Town centre location, conservation area, pedestrian street—small shop unit and living/kitchen on ground floor, three bedrooms and bathroom above, garden and detached two-storey studio/workshop. £10,150. Roger Kelly, 16 Paul Street, Frome, Somerset BA 1DT. Tel: Frome (0373) 4628.

Ecologist's Conference on "Ecology and Economics"

Conventional economics (Capitalist and Marxist alike) with its ethos of expansion and economic growth, is supposed to provide complete answers to any central economic and human problems. But when it does not, or has not provided any answers at all, what is to be done?

Today the world is faced with the side effects of the tools of conventional economics — mass unemployment, pollution, destruction and exhaustion of natural resources, energy shortage, psychological and social breakdown of industrial society. What is the way out of this predicament? A continuation of the present acquisitive growth economy which recklessly exploits nature for commercial gain, or the development of a less acquisitive growth economy, which takes a holistic view of nature by keeping *PEOPLE* instead of *PRODUCTS* at the centre of attention?

In other words, the creation of economics of permanence, stability and survival, which makes ecological sense and does little damage to the ecosystem and society. This is the theme of a two-day conference organised by the "ECOLOGIST" to be held at Conway Hall, 25 Red Lion Square, Holborn, London W.C.1 on Thursday and Friday 30th and 31st of May, 1974.

REGISTRATION FEE: £5.00 including tea, coffee and refreshments on both days. (Students, £2.50).

CHAIRMAN: The Rt. Hon. Bruce Douglas-Mann. Labour M.P. (Kensington North).

Among those who have agreed to speak at the Conference are:-

Robert Waller, Author of "*Be Human or Die*" — A study in Ecological Humanism and Associate Editor "*Ecologist*".

John Adams, Lecturer, Department of Geography, University College, London.

Andrew MacKillop, Managing Director, Low Impact Technology Ltd. and Associate Editor "*Ecologist*".

Peter Hain, Former Chairman of the Young Liberals; and co-author of the Young Liberals' Pamphlet, "*Scarborough Perspective*".

Edward Goldsmith, Publisher and Joint Editor "*Ecologist*".

Dr. Bernard Dixon; Editor, "*New Scientist*".

Paul Derrick, Researcher in the Research Department of the International Co-operative Alliance; Secretary of the International Co-operative Alliance Consumer Working Party and Secretary of the Robert Owen Bicentenary Association.

Richard Grinham, Associate Editor, "*Land and Liberty*".

And many others.



REGISTRATION FORM

Closing Date of Registration: Friday, 24th May 1974

TO: The "ECOLOGIST", 73 Molesworth Street, Wadebridge, Cornwall, PL27 7DS (Tel. 020 881 2996/7).

I wish to reserve place(s) at £ for the Conference "Ecology and Economics".

I enclose £

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