Priorities in the Control of Environmental Pollution

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During the past three years so much has been said and written on the subject of pollution and so many wild statements have been made that many people feel that human life on this planet is in imminent danger of extinction. In the medical profession we are accustomed to looking at the known facts of a problem, but the many areas of doubt in this field make it difficult to obtain a really balanced view; it is hard to steer a course between evangelism and complacency.

In his address to the Royal Society of Health Congress last year Sir George Godber pointed out that it is never possible to prove the safety of any substance in the environment and we have had a number of shocks when unsuspected effects have been discovered, sometimes of quite common substances in the environment. One needs only to mention aspirin, asbestos, or the aromatic amines. With many substances the circumstantial evidence of safety is so strong as to be virtually conclusive and with some it is possible to set a limit to the size of a potential risk and show that if any harmful effect exists, it is so small as to be virtually immaterial. The many unsolved problems make research a first priority; coupled with this there must be adequate systems of monitoring the environment, organised preferably by international agreement, to provide the information necessary for comparative studies in different areas and different parts of the world.

In the United Kingdom the National Survey of Air Pollution provides valuable information, since it relates measurements of air pollution to different types of environment, and from it one can judge whether an area suffers from more or less pollution than would be expected from its environmental characteristics. It deals only with smoke and sulphur dioxide pollution; ad hoc studies are necessary when information about the distribution of other pollutants is desired. Differing units and methods of measurement make it difficult to make international comparisons.

Water pollution is obviously a most important subject. In the United Kingdom, with its growing population and increasing industrialisation, there is an urgent need for the utmost care in the conservation of water supplies and the maintenance of amenity. The subject has been surveyed in detail in the
recently issued report of Mrs Lena Jeger's Working Party on Sewage and Sewage Disposal (1970). Extensive post-war building programmes resulted in the over-burdening of sewage works and there was a serious lag both in the provision of extensions to existing works and in the building of new plant. In addition, the rapid expansion of industry made the already existing problems of industrial pollution more serious. Nevertheless, the combined efforts of the river authorities and local government have gradually improved the position. An increasing number of industrial effluents are treated in local authority sewage works, and fish have returned to many previously lifeless rivers. Unfortunately, there are still many rivers in industrial areas whose condition can only be described as deplorable. A survey carried out in 1958 showed that of 20,000 miles of rivers in England and Wales, 14,603 miles (73 per cent) were classified as unpolluted or recovering from pollution and 1,278 miles (6 per cent) were regarded as grossly polluted. Results of a new survey are expected shortly, and further improvements are planned. For instance, it is suggested that industries discharging effluents directly into a river should be called upon to pay according to the amount of pollution they cause.

From the medical viewpoint it must always be remembered that a sewage effluent is not sterile and will, unless very expensive treatment is undertaken, contain considerable numbers of pathogenic organisms. It is customary, therefore, for health officers to advise against river bathing; although the degree of risk is usually very small it is never possible to define it accurately and there may be areas where it is unexpectedly high. The apparent purity of a stream can be deceptive since it could be heavily polluted by pathogens from a carrier living in some isolated situation.

Considerable anxiety has frequently been expressed about the pollution of the sea coast and bathing beaches. Here the amenity aspect is obvious. Possible medical hazards were considered by a Committee of the Public Health Laboratory Service in 1959, and epidemiological studies of the incidence of enteric disease and poliomyelitis indicated that with bacterial and virus diseases the degree of dilution was such that there was no effective risk to health. Experimental studies have shown that the minimum infective dose of a pathogenic organism may often be of the order of many hundreds of thousands or indeed millions of organisms. The problem was reconsidered by the Jeger Committee which confirmed that there was no reason at present to believe that the risk of disease was anything more than minimal. However, patterns of infectious disease are liable to change and the position must be kept under review; infectious hepatitis in particular is a disease that requires careful watching at the present time. Epidemiological investigations are
difficult because it is hard to detect the occasional case of disease that might be due to sea bathing, against the background of the far greater numbers of cases of the same disease contracted as a result of other means of infection. Aesthetic and amenity aspects are obviously important, and short outfalls, whether of treated or untreated sewage, are to be condemned. Modern engineering methods have drastically reduced the cost of building long outfalls, and since a conventional sewage works reduces the pathogenic organisms approximately by 90-95 per cent only, a much better degree of dilution may often be obtained by discharging partially treated sewage from a long outfall than by discharging fully treated sewage through a much shorter pipe. In any particular town the requirement must always be determined by local conditions.

This country is probably second to none in the purity of its drinking water but the rapidly increasing demand and shortage of new sources has forced an increasing reliance on the purification of river waters that may contain considerable quantities of sewage and industrial effluents. Interesting studies are now being made on the purification of water from the River Trent at Nottingham. Modern water treatment has reached a high degree of efficiency but scrupulous care is always necessary because a single failure in treatment can, under the appropriate conditions, lead to a mass outbreak of disease. Accidental chemical pollution of rivers is now a growing hazard. Authorities, relying on river water, have always to be alert to the necessity of closing down the river intakes. Oil is one of the commonest chemical pollutants and, if adequate action is not taken, it will taint the water. This is a fortunate safeguard that prevents more serious concentrations, with their associated polycyclic hydrocarbons, passing undetected into drinking water. Serious pollution by substances such as cyanides or pesticides quickly becomes apparent by killing river fish, and requires immediate closure of a river intake. Improved chemical monitoring will obviously help in dealing with this problem.

Underground waters, used as a source of drinking water, may be affected by soil pollution. The extensive use of nitrogenous fertilisers will increase the nitrate content of these waters and produce a risk of infantile methaemoglobinaemia. The combination of excessive nitrates with phosphates, mainly derived from synthetic detergents, is likely to stimulate growth of algae, causing serious trouble in lake and other inland waters.

The salts of some chemicals such as lead may be absorbed by the root system of plants, thus producing undesirable contamination of vegetables. However, plants are able to resist the excessive absorption of substances such as fluoride. Industrial waste can produce some odd problems; only recently a bulldozer uncovered a long forgotten cache of containers filled with cyanide
lying nearby a borehole used as a source of drinking water. Disposal of industrial waste is difficult, and the Government is now studying the recommendations of the Committee on the Disposal of Solid Toxic Wastes (1970).

Pollution of the sea has suddenly come into prominence. One contaminant is mercury, which may come from industrial waste, the burning of fuels, and from natural sources. Under anaerobic conditions on the sea-bed metallic mercury may be converted by bacterial action to the more toxic methyl mercury and appear in the marine food chain. Much research will be needed before definite assessments can be made of hazards and margins of safety. Oil pollution of the sea can contaminate shellfish. Fortunately, the taste of these tainted fish will stop people eating them but it has been suggested that the shellfish can eliminate the taste while retaining the polycyclic hydrocarbons. Even if this is so, the minute quantities involved are unlikely to be a hazard, but more information on this point is required.

The increasing knowledge of carcinogens in the environment has to be kept under review. Polycyclic hydrocarbons are constantly present in man's natural environment and they are also produced in the preparation of food and the burning of fuel. Nitrosamines may be synthesised in the body from nitrates and nitrites, both common constituents of the diet. It is easier to identify carcinogens in the environment than to assess their risk to health.

THE ASSESSMENT OF PRIORITIES
Environmental pollution has such wide ramifications that it is necessary to consider carefully the most important priorities both in research and control. The demands of amenity must be considered together with possible hazards to health. One of the most important medical hazards at the present time in terms of total mortality and morbidity is that of air pollution derived from the burning of domestic fuel, but the operation of the Clean Air Act already appears to have had an important effect in reducing the peaks of excessive mortality and morbidity once associated with smoke polluted fogs. It is hoped that the same measure will substantially reduce the incidence of chronic bronchitis caused by air pollution. So far no link has been established between health and the amounts of sulphur dioxide and of diesel and petrol fumes (including carbon monoxide) found in urban atmospheres. Nevertheless, there is general agreement on the desirability of reducing these as far as is practicable. Ground level concentrations of sulphur dioxide have already fallen considerably as a result of changing fuel patterns, and international discussions are taking place on methods of reducing vehicle fumes. Water pollution must be the subject of constant vigilance and there is need for more information on the effects of trace substances in drinking waters. The recently
reported relationship between hardness of water and cardiovascular disease (Crawford et al., 1968) is an important example of this. Food contamination requires rather different methods of control for it is usually possible to lay down standards of quality and insist on their observance. Here, as in all aspects of environmental control, there is need for the checking of the results of research already performed. An examination of the world literature reveals much that is contradictory, leading to the adoption of widely differing standards in various countries.

In Britain we are fortunate in that we have a system which, with certain exceptions such as food quality control, can function without the setting of strict legal standards. For water pollution there are very valuable internationally recognised standards that for the most part have a firm scientific basis. This is not so with air pollution, and in the UK a firm determination to reduce pollution is having, and will probably continue to have, more effective results than prolonged discussions on the exact levels of pollutants that may be regarded as acceptable.

This article is based on a paper read at the General Meeting of Members held at the Royal College of Physicians in November 1970.

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In Praise of Exercise
Inactivity never fails to produce an universal relaxation of the solids, which disposes the body to innumerable diseases. When the solids are relaxed, neither the digestion, nor any of the secretions can be duly performed. . . . How can persons who loll all day in easy chairs and sleep all night in beds of down fail to be relaxed. Nor do such greatly mend the matter who never stir abroad but in coach, sedan or such like. . . . Weak nerves are the constant companions of inactivity. Nothing but exercise can brace and strengthen the nerves. . . . We seldom hear the active or laborious complain of nervous diseases; these are reserved for the sons of ease and affluence. Many have been completely cured of these disorders by being reduced from a state of opulence to labour for their daily bread. . . .

It is absolutely impossible to enjoy health when the perspiration is not duly carried on; but that can never be the case when exercise is neglected. . . . Exercise alone would prevent many of those diseases which cannot be cured and would remove others where medicine proves ineffectual.

(From William Buchan’s Domestic Medicine, fifth edition, 1776.)