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ISSN 0953-0932

£7.00 inc. postage
Published quarterly

Editorial

DISASTERS, GOVERNMENT AND SCIENCE

From lightning and tempest; from plague,
pestilence, and famine; from battle and murder, and
from sudden death,
Good Lord, deliver us

This prayer has been in use in Anglican churches for over three hundred years. Such disasters are still with us and almost daily we learn of one from the radio, television or our newspapers. Nowadays such news is seldom accompanied by a call to prayer, nor like Edmund in *King Lear* do 'we make guilty of our disasters the sun, the moon and the stars'. Instead we demand that the Government (national or local) or an international agency do something to prevent a recurrence and to mitigate the immediate effects.

The characteristic response of governments to dangers which threaten lives and health is to dither. Examples of such ditherings have been presented to us almost daily by the media. There have been the threats arising from infectious diseases, hitherto unknown ones and old ones emerging again with increased virulence; from environmental pollution in many towns; from pollution of drinking water at its sources; from the disposal of industrial wastes, especially where they are radioactive; from the misuse of murderous weapons when they get into the hands of insane individuals and unscrupulous governments. Examples could be given from every country. The dithering arises because the benefit to health from any regulatory control is always offset by some economic loss or adverse social effect. Control necessitates some loss of liberty; freedom and liberty are now too often seen, both by individuals and by governments, as absolute rights and not as dependent on fulfilment of duties. An appropriate balance between the likely benefits and possible adverse effects of any control measure is required and this depends on probabilities and risks. These are matters of science.

In democratic societies where the political system is largely adversarial rather than co-operative, dithering is increased by fear of the government party for the opposition. What may be presented to a government as a rational measure may be delayed or not put into effect because of the fear that an associated consequence may be exploited by the opposition and possibly enable them to pass a no confidence motion and seize power. To stay in power is a primary objective of members of government. The consequence of making a decision may be ultimately political when initially the proposal arose from social or economic considerations.

History records from countries worldwide innumerable disasters that arose from strife due to religious prejudices. Attempts made to promote one set of beliefs above all others have led to violent suppression of unbelievers. There are today sects of Jews, Christians, Muslims and even Hindus, members of which resort to fearful atrocities. These may follow government action which might not itself have had a religious context, but reflect widespread materialistic attitudes. Fortunately the risks of disasters arising in this way appear to be much less than formerly, but they are still there and well-known in some parts of the world.

The prevention of disasters, except those arising from natural causes such as earthquakes and hurricanes and the mitigation of the effects of all of them, require a government whose members can understand a scientific problem and the uncertainties that may follow any action or inaction; it has to have the support of a population that is scientifically literate. The essence of science is to collect observations as accurately as possible and from them to form an hypothesis. An hypothesis by definition may be proved to be wrong by the discovery of a new fact inconsistent with it. Science is thus always uncertain. Its laws are not like the laws of the Medes and Persians. Newton's laws of motion and Starling's law of the heart are now seen as useful approximations; new knowledge has led to modifications of the original laws. In practice science leads to probabilities that may be determined mathematically; but subsequent application is always associated with some degree of risk. In this way scientific actions differ from those reflecting personal prejudices and the dictates of magic or revealed religions. Scientists have to present the problems in as unambiguous language as possible so that those who are not experts can understand. These are educational problems.

The importance of teaching every child the basic principles of science, the pursuit of rational thought and the principles of evaluation and assessment of risks is absolutely fundamental if we are to move forward and get good government action. Too few school children choose to study scientific subjects sufficiently to be able to go on and take a science degree at a university. This is partly because schools now have great difficulty in recruiting science teachers. This can be changed only by raising the status and rewards of teachers and by providing them with materials required for teaching the sciences. Further, many science graduates have not acquired the literary and linguistic skills to present their problems, their thoughts and hypotheses in a manner which an intelligent layman can understand. Until science education in schools and universities is improved we can expect that dithering will be the likely immediate response of a government to any new disaster.

Medical science which underlies both clinical and public health practice is beset with uncertainties. There is wisdom in a new book, *Science and the Quiet Art*, by David Weatherall, the Regius Professor of Medicine at Oxford, who has followed two of his predecessors, William Osler and Archibald Garrod in that, despite a lifetime of clinical practice and teaching, he has had the energy to think about and found the time to write about medicine in all its broad aspects. The effective treatments of two formerly fatal disorders, diabetes and pernicious anaemia, are obvious examples of the value of basic science; so also is our ability to treat and control so many infectious diseases and the surgeons' ability to repair damage from accidents, violence and degenerative conditions. These successes have been followed by organ transplants, hip and joint replacements and the marvels of diagnostic procedures such as MRI. As a result the public seems to have the impression that the medical profession should now be able to treat and prevent all diseases. Unfortunately the basic science that underlies many rheumatic and most psychiatric disorders is sadly lacking. A premature death from one of the diseases associated with old age is often a disaster for the family and friends of the dead person. Despite much research we have too little knowledge to be able to prevent large numbers of men and women from dying prematurely. The science of gerontology is still in its infancy. For these and other reasons related to the social and economic state of society, notably long waiting-lists and failures to

deliver services, the general public have become disillusioned and the prestige of the medical profession suffers.

For the medical profession there is a dilemma. The art of good clinical practice is to appear authoritative to your patient. It is then easy to slip on a mantle of authority and with it give opinions on treatment and health policies for which there is no scientific basis. Today in medical education, both undergraduate and postgraduate, and in research the necessary balance between basic science and the use of modern technologies has shifted too far against basic science. All of us need a better understanding of the basic sciences and their uncertainties if we are to improve advice to governments and to patients on how to prevent disasters, public and personal.

Governments have not always been ineffective in coping with potential disasters. In 1348 the Venetian Republic imposed a quarantine on ships suspected of carrying plague from the Levant. In making this decision they would have been aware of loss of trade and its effect on their economy, but their action must have saved many lives. In 1844 when cholera raged in London the epidemiological study of John Snow showed beyond doubt that the infection was water-borne. This was a trigger for the government to introduce many Acts to protect the health in a population recently industrialised. As a consequence of Clean Air and Smoke Abatement acts, the sun can now shine on Edinburgh and the former nickname of the city, 'Auld Reekie', is becoming forgotten as also the multitudes of sufferers from chronic bronchitis who formerly crowded the waiting-rooms of general practitioners and hospitals.

Perhaps in 500 years time, when historians are trying to put the events of the twentieth century into perspective, the two world wars which directly led to many millions of deaths from violence and disease will not be given first place. These deaths were a consequence of years of dithering in the foreign offices of national governments. Many more potential deaths in this and future centuries may have been prevented by the eradication of one of the great pestilences of history, smallpox. Although ideas for the prevention of smallpox had been around for some three hundred years and vaccination had been effective for many years in some countries, the possibility that smallpox could be eradicated from the whole world only arose some fifty years ago. It was soon taken up and eradication was accomplished by the co-operation, not dithering, of literally hundreds of Governments (local, regional and national) and by international agencies, and accomplished by applying established science with competence. This has been the great event of our era, not putting a man on the moon. There is hope for us all.