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## **Helping the public judge contentious issues involving science**

Arthur Hawkins, Chairman of Britain's Central Electricity Generating Board, has already made up his mind. 'In our view these important matters are best dealt with by experts and by the procedure laid down by Government and not debated before the world before decisions are made.' This assertion concerning nuclear reactor policy, which Mr Hawkins made before the Select Committee on Science and Technology on 18 December 1973, is all too typical of a problem long familiar to readers of *Science Forum*. However, once you have deplored the attitude embodied therein, what next? If you are uneasy about the 'expert syndrome,' and disinclined to leave major public policy for cosy decision-making among interested parties behind closed doors, what steps can you take? The difficulty is of course peculiarly acute when the issues in question involve specialists' scientific and technical knowledge. The claim is made by those of Mr Hawkins's cast of mind that only people who are privy to the relevant mysteries can reach appropriate conclusions in the public interest. This claim, however specious, is not an easy one to counter, particularly for anyone susceptible to pseudo-scientific sleight-of-hand. It is all too possible for sectional interests to overwhelm the general public, to persuade people that they cannot comprehend or judge science-related issues.

The problem begins during formal schooling. Ideally a rounded education ought to develop both literacy and numeracy: an educated twentieth-century human being ought to feel as comfortable in the presence of numbers as he does in the presence of the written word. Such an ideal is, alas, far from universally attained. But innumeracy by itself is not the problem. It is by no means simple to establish just which aspect of science-based knowledge induces in the uninitiated a concession of their incapacity.

Any casual acquaintance in a bar will offer opinions about economies, politics, law, business, medicine, public administration, professional performance in art or music or literature or sport - why then does an abrupt reluctance intrude as soon as 'science' becomes relevant to the discussion? It cannot be merely the language; other areas have jargon at least as highly developed, but do not succeed to nearly such an extent in browbeating the man in the street.

There are, to be sure, some clearly pathological symptoms still occasionally extant. It is still possible for a self-satisfied business or professional man to announce 'Oh, I never could do science,' as if expecting congratulations. It is also possible to find many who will concede without argument Mr Hawkins's viewpoint, saying 'Oh, I'm sure the experts will come up with something - science will always find a way.' But it is apparent now that for a sizeable fraction of the general public - probably a majority - science, however defined, has acquired a vaguely worrying aura, as a potentially malevolent and uncontrollable agency that may provide benefits but that may, on the contrary, create monsters.

As long as scientific activity was confined to small laboratories, privately funded, and of comparatively minor military and commercial significance, the separation between science and public policy could be sustained with little harm. Such is no longer the case. Scientific activity makes enormous demands on industrial and public funds, involves a measurable percentage of the actively employed, and spills over everywhere into daily commerce and society. Science has become a field in which special sectional interests abound; it has also become inseparably entangled in many categories of sectional interest that are otherwise already engaged in political and economic power-struggles. In short we must now consider 'science policy' - a subject that, say, fifty years ago, scarcely existed.

Who shall consider science policy, in what context and on what basis? Clearly, since science policy in its broadest definition affects each and every individual, the responsibility for it ought to extend throughout the community. That, however, brings us up against the mysteries. Can one hold and express a valid opinion about an aspect of science policy if one is not a scientist? You could with equal justice ask 'Can one hold and express a valid opinion about an aspect of law if one is not a lawyer?' The situation is precisely analogous, and the answer in each case is affirmative. The niceties of a point of law may require extensive familiarity with cases, with precedents, with procedures; only a lawyer will be equipped to pronounce coherently on them. But a layman of average intelligence, on the basis of reasonable general information, can hold a fully developed and defensible viewpoint on an issue of public policy as it relates to the law - indeed this is the basis of common law.

The question is not one of legal niceties but of policy: that is, of options, choices, and judgments, in a general social context. (An issue of precisely this kind now preoccupies many minds: the issue of drug-control legislation, with the intricate interplay of relevant considerations of fact, allegation, and policy.) In a similar sense a layman of average intelligence, on the basis of reasonable general information, can hold a worthwhile and valid viewpoint on an issue of public policy as it relates to science or technology. Once again the question is not one of inside details but of basic policy. Time and again a situation is presented as if only specialized technical judgment would make it possible to decide between available options; almost invariably it proves, upon closer examination, that the essential issue, if stripped of the superfluous expertise, could be evaluated rationally by a schoolchild.

What seems to be required, then, is a means of reassuring our fellow men-in-the-street that their opinions on science policy in its broadest sense are worthy of consideration. Once someone describes to you how a magician's trick works, you may still be impressed by his skill without being unnerved by it. My colleagues and I have been for some years engaged in presentation of various issues of policy, arising first in the environmental field, that have partaken of the scientific mystique. It has regularly been necessary for us to preface a campaign with a concise educational introduction to the subject.

In 1972 and 1973 Friends of the Earth, the organization with whose British wing I work, wrote and published their *Whale Manual*, bringing together the cetological, economic, technological, legal, and political bases for the FoE campaign to ban commercial whaling (Britain on 15 March 1973 banned the import of most whale products); *Rock-Bottom: Reaching the Limits of Metal-Mining in Britain*, a study of

the geological, ecological, technological, economic, social, and other circumstances arising from Rio Tinto Zinc's plans for an openpit copper mine in the Snowdonia National Park in Wales, plans that FOE stubbornly opposed and RTZ eventually abandoned; *Packaging In Britain: A Policy for Containment*, a study of the materials, technology, economics, and waste-generation implications of current trends in packaging, in support of the FoE campaign for controls on irrational forms of packaging; and many magazine articles, pamphlets, and other documents, frequently incorporating basic science education as an essential component of a campaign. FoE was involved for a time as consultant to the British publishing program of Ballantine Books, a happy but unfortunately shortlived collaboration. The Red Alert series was a natural development of these various lines of activity and involvement.

The Red Alert books - despite their admittedly somewhat lurid exterior! - attempt to lay bare, in concise, accessible, everyday language, the workings of certain scientific and technical processes of contemporary importance. The intention is not to add to the number of qualified nuclear engineers and metal-miners, but rather to reassure those who are neither, that they can still contribute valid value judgments about the activities of nuclear engineers and metal-miners. You do not need to know how to build a reactor, nor how to dig a mine, to know whether you consider it advisable to build one or dig one at a particular time in a particular location. But you will be better able to defend your opinion, and less likely to be 'blinded with science' - a giveaway phrase if there ever was one! - when you can speak the language of nucleonics and mining.

In the nature of the situation it usually seems that the 'experts' in a field are aligned with advocates of its expansion - for obvious reasons. It is always needful, therefore, to point out not only that a particular science-based development may imply problems, but also that it is only one of many options, and that other options, while neither so glamorous nor so profitable, may nonetheless be more beneficial in the long term for society as a whole. Political and economic decision-makers need to understand the options and the implications. Journalists and other media people need to be able to recognize the relevant factors among the welter of information in order to report effectively on the issues. The general public, if they are to exercise their democratic responsibilities, need to know what their representatives are talking about - or failing to talk about. They need to know what questions to ask, and how to recognize an inadequate answer. Above all, they need to acquire the information and understanding with a minimum of delay, and without making an overly demanding commitment to intensive study.

The Red Alert books are an attempt to meet these needs. Now, for my part, I wish somebody would write me one about offshore oil ... and one about coal-mining ... and one about the petrochemical industry ... and one about solar energy ... and one about pipelines ...

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