

of Health had begun to seem inadequate is perhaps the least important worry outside Bethesda, although it is a timely reminder that the scheme sprang from an honest and courageous wish to help with the management of the scientific literature. The real trouble has clearly been the difficulty of reconciling the inherent contradictions in the scheme. There has, for example, been the problem of preserving the confidential character of the groups, and thus the informality of their communications, without restricting their scope so as either to exclude deserving members or to create a rash of tiny splinter disciplines. In the past few months there have probably been more complaints from people unable to belong to groups in which they had an interest than from those added to the mailing lists without warning of the flood of paper they would have to deal with. Obviously such a state of affairs could not indefinitely have continued. Either there would have grown up such tensions that the communications of the groups would have had to be distributed without restraint or—more probably in these days of copying machines—these documents would have circulated far beyond the ken of the organizers, who would then have been still less able than at present to control plagiarism. Plainly the National Institutes of Health have learned of these problems the hard way, for it is now accepted that information exchange groups which may emerge in future, under other auspices, should be limited either in time or by the scope of their subject, but even these restrictions might not ensure stability. Overriding all these questions of feasibility is the issue of principle which has exposed the IEG experiment to criticism from the beginning. If the system worked well, it would differ from orthodox publication only in its lack of discrimination in content and by the fact that all but a selected group would be denied access to it. Whatever practical advantages there may have been, this would have been an offence against scholarship.

Because the faults of groups were predictable, however, it does not follow that their virtues can be ignored. The National Institutes of Health may properly reflect that if the information exchange groups have not been a roaring success, their existence has been a vivid proof that working scientists need better communications within the profession. One obvious consequence should be an improvement in the conduct of the existing journals. Speed is a necessary and an attainable end, but there may also be a place in more orthodox journals for some of the informality which has made the Information Exchange Groups welcome in many laboratories; the habit of writing for posterity is often an impediment to communication with those still alive. There may also be great benefits in methods of communication which deal differently with factual information and with concepts; certainly there is room for experiments in that direction. There are also likely to be substantial gains in the new technology of reproduction, not merely on print but on computer tape. The sheer mechanics of printing and copying should not, however, obscure the now urgent need for

an improvement of the fitness of the literature for the everyday purposes of the scientific profession. Mere quantity is less important.

TOO MANY AGENCIES?

THE most striking characteristic of the pattern of public spending on research and development in the United States (see page 869) is flexibility. Ten years ago, the Atomic Energy Commission was the biggest spender. Five years ago it was the Department of Defense. NASA is now a close second. Nobody would predict with confidence what agency of government will be the dominant force in the early seventies. These ups and downs may frequently be exhilarating, particularly for those who are not directly involved in the decline of a big spending agency in the hierarchy. They are also a proof of how the United States can direct its energies in technology to goals which change quickly from one year to another. At the same time, however, they are a good reason for asking whether such a heavy and direct involvement in research and development of agencies and departments of the United States Administration is the best way of making sure that the pattern of spending is that best suited to the long-term needs.

The first thing to be said is that the dominance of the quasi-military departments of the United States Government is certainly understandable and probably unavoidable as well. The importance of the Atomic Energy Commission was a simple consequence of the importance of nuclear weapons in the early fifties. The missiles which preoccupied the military in the second half of that decade explain why the Department of Defense then sprang to the front. And everybody knows about getting to the Moon, of course. The aggregate spending on these three kinds of activities is not outrageously different, as a proportion of the entire budget for research and development, from what is spent in countries such as Britain. Yet there are important differences. For one thing, the budgets of the great agencies such as the Atomic Energy Commission include large sums for basic research, much of it at universities. Another important idiosyncrasy of the pattern of spending in the United States is that there is no dominant sponsor of basic research as such. The National Institutes of Health and the National Science Foundation have money to spend on basic research, and between them will administer \$635 millions in the current financial year, but this is appreciably less than the budget for basic research within NASA, and less than a third of all the public money available for basic research in the United States. In the circumstances, it is natural to wonder if this money would bring still greater benefits if more of it were channelled through independent agencies like the National Science Foundation. As things are, there is a risk that science in the United States may too often be required to indulge the whims of the great executive agencies of government.