

organization to occupy that role, particularly now that the Council for Scientific Policy has lost much of its first gloss. The trouble, of course, is that the Science Research Council will need more than just check if it is to grow into the kind of organization which circumstances require. One sure and comparatively quick road to disaster would be to give in to the temptation to become a kind of lobby on behalf of the scientific research community. In this spirit, it would be comparatively easy for the Science Research Council to fill the next and succeeding annual reports with complaints that shortages of funds are hampering research in dozens of valuable and important fields.

It would also be comparatively easy—and much more comfortable than any other kind of policy—for the council to support for the indefinite future a pattern of research in British universities which is qualitatively similar to that which now exists. One obvious difficulty is that these easy courses of action, or inaction, are unlikely to carry conviction with the outside world, and particularly with the Government. Another is that they are unlikely to be in the best interests either of the universities or of the rest of the scientific community. This is why it is welcome that the Science Research Council should have openly declared its intention that the work of the scientific community should be more directly valuable to industry. This is a tangible strategic goal even if, in some ways, it is somewhat over simple. It cannot be long, however, before the council will have to provide itself with a policy-making apparatus which can play an important part in the forward planning of research. It will not indefinitely be sufficient to employ somebody to read reports like those recently produced by Professors Swann and Dainton, looking for signs of the way in which the wind is blowing. Indeed, the council will quite quickly find itself having to deal with all kinds of apparently unrelated questions—professional salaries, for example, or the machinery for appointments to senior positions in public laboratories.

But what if people should seriously disagree with the kinds of policies which the Science Research Council tries to implement? What channels of protest are open to those who, perhaps mistakenly, disagree with the council's view that a British contribution to the 300 GeV machine would be a good investment of resources? And what if there is serious disagreement about the emphasis which the council is putting on the need to provide practical help for British industry? There are bound to be, for example, many people who regret the way in which an expansion of postgraduate teaching has been yet again postponed. The conventional answer is that the wide representation of scientists on the council itself and on the committees, sub-committees and working groups whose names occupy no fewer than nine pages in the latest annual report is a guarantee that the council accurately reflects informed opinion. This, however, is a false claim. Most of the committees are hamstrung by their terms of reference and, to the extent that committee members are made trappist by their office, may even be an active disservice to the

democratic cause. This is why it is essential that a more active and creative council should also be a more open council, willing to publish justification for its decisions and even its internal disagreements. Fortunately, the new council seems to have its heart in the right place even on this contentious score. In the past few months it has published a reasoned argument for the future policy in astronomy, and has made known the original division in the council on the support for the 300 GeV machine. If there can be more of that, the council will have prepared the foundation for a most valuable instrument of public administration. If only professional scientists who are not members of the council's committees can forsake their present cowardly habit of reticence, there is a real opportunity for the scientific community in Britain to be as much in charge of its own affairs as anybody has a right to hope.

UNIVERSITY EDUCATION

Science for the Thousand

THE Swann Report made it abundantly clear that British science education would be more useful if it was more general. It said, "To help the individual meet the current and future needs of employment and to give wider opportunity in the career, we recommend that British universities should consider the possibility of making the first degree course in science, engineering and technology broad in character." There are three undergraduate generalist courses available in Britain, Science Greats at Manchester, Technological Economics at Stirling and Science Studies at Edinburgh. There are also two postgraduate courses in the social aspects of science and technology at Sussex and Bath. All are recent innovations, which the Swann committee urged should be used as models for similar experiments in every university, but how are they faring?

The three undergraduate courses are different in scope and approach and only those at Manchester and Stirling are at degree level. Science Studies at Edinburgh, an optional course, which started last year with fifty-five students, occupies one seventh of the first three years and seeks to provide an overall view of the social consequences and context of science. The Stirling course in Technological Economics was also started in 1967 with six students, and about the same number have been recruited this year. The overall director is Professor Bradbury, professor of industrial science and for twenty years a member of the Mond Division of ICI. The aim of this course is to teach science and economics in a fully integrated way. For the first three years students will divide their time equally between a traditional science course, economics, and a mixture of industrial science and mathematics. The fourth year will be devoted to management and technological economics and industrial science. In other words the course, especially in the final year, will be closely geared to realistic business situations, and Professor Bradbury believes it should produce economists who know some science and should be ideal candidates for research and development and industrial production teams. The chief problem is that of publicizing the course among the schools.

Professor F. Jevons, head of the Department of

Liberal Studies in Science at Manchester, did his share of that in 1966, when the department was started. In 1966 there were thirteen students who had originally applied or were already in the traditional science departments. Last year there were ninety-three applicants, some again from the traditional departments, for eighteen places. This year a hundred applications were made direct and the academic standard of those accepted compares well with students in the other science departments. What is more, this summer the other great obstacle to recruitment, namely the fear of potential students that employers will fight shy of people graduating from a general science course, seems to have been disposed of. Twenty-seven of the thirty-two first and second year students took vacation jobs from no less than 171 offers from companies and public corporations and several of them have, on the strength of their summer's work, been offered jobs as soon as they graduate and apparently most of the companies were very enthusiastic about the quality of the students.

Professor Jevons says business is thriving. What is the successful formula? Insisting on high calibre students from the very start (GCE A-level grades of a B and two Cs including physics and mathematics are the usual requirements) is perhaps the most important factor. But the course which has attracted these students is a judicious blend over three years of economics, history of science, biological and physical sciences, mathematics and science policy, obviously a very different approach to generalist science from that adopted at Stirling. The department is now about to apply to the SRC for funds for a postgraduate course to start next year and to cater for graduates from the conventional science departments. Judging from the SRC's latest policy statement (see page 216), there should be little difficulty in getting the money. But being copied is the best evidence of success, and at Sussex there is talk, at the postgraduate Unit for the Study of Science Policy, of setting up an undergraduate course along the lines of that at Manchester.

Neither the Manchester nor Stirling courses have accepted any arts sixth formers although Manchester is trying to decide how best to do this and at Stirling the only essential requirement is A-level mathematics. The university says it will teach science to any arts applicant with this qualification but, perhaps fortunately, no one has taken up its offer yet. At Bath, however, the one year postgraduate course in the Sociology of Science, directed by Professor Cotgrove, is designed for sociologists although there is a preliminary year's conversion course to introduce scientists and engineers to the ways of sociology. The whole project, however, is on the point of collapse because only two people have enrolled in its first two years. Unless it gets off the ground next year, which must seem unlikely, Professor Cotgrove says the university will have to stop the course or alternatively, if anything comes of current discussions with industry, change it into a course for industrial scientists likely to move into administration.

STUDENT RECRUITMENT

Swing Back to Science

Is the swing in the popularity of British university courses from science to arts and social science courses

a continuing trend, or has the attention recently devoted to the problem been effective in arresting the swing? At the beginning of the new academic year, the general opinion seems to be that the number of applicants for science places as a fraction of the total number of applicants is much the same as it was last year, and that at least it is not decreasing as much as might have been feared. There is even some evidence of a swing back to the sciences among school children now entering sixth forms.

The number of places available at universities is determined principally by the amount of money the University Grants Committee (UGC) can be persuaded to part with, and this in turn depends on the demand for places in previous years and on existing long-term plans for expansion. Cuts have forced Exeter University, for instance, to reduce quotas for admissions to science departments by 10 per cent this year. Elsewhere, quotas for admission to science faculties are about the same as last year, and usually they seem to have been filled. Some universities admit that if more science places were available, they might have some difficulty in filling them without lowering standards.

A parameter used as a measure of the relative popularities of various courses is the ratio of the number of applications to the number of available places for various subjects. This is not a particularly meaningful statistic because the number of applications includes all applications, irrespective of their quality, but it does give some indication of general trends. At Sussex University this year the ratio is 21 for arts subjects and 13 for science subjects—ranging from 21 for biochemistry, through psychology, applied sciences, physics, chemistry and biology to 8 for mathematics. Last year, the ratios were 9.5 for science subjects and 21 for arts subjects. The fact that the number of arts applications is not rising as rapidly as was expected may be explained by some degree of pre-selection at schools, where children are warned that the competition for arts places is fierce. At Birmingham, the number of applicants per science place is 11 this year, compared with 12 last year, and for arts places is 19 this year.

Some of the least popular courses at the older universities are the engineering courses—perhaps a result of the increasing intake of students to the newer technological universities. These, however, appear still to have some difficulty in recruitment. Newer courses, such as biochemistry and computer science, seem to be increasingly attractive. In line with current sensitivity about early specialization, combined honours courses, according to Professor D. J. E. Ingram of Keele University, are becoming more and more popular generally.

SALARIES

Who's Paid What

THE five British science institutes have completed salary surveys of their members, and the preliminary results are published as a supplement to *Chemistry in Britain*. The median salaries by age group for each institute are compared in Table 1. Fellows and associates tend to have better degrees and longer experience than licentiates or graduates.