

thought it wise to have a Foreign Secretary before the British Government had appointed one. The point is simple but essential. The progress of science is necessarily fitful but certainly the more efficient and effective when scientists everywhere are able to contribute towards it. The fact that people live in different countries is often not so much an impediment as an incentive to collaboration—people often learn more from each other when they work in different environments. This, no doubt, is a part of the reason why the Cern laboratory at Geneva has been such a success. This, too, is why research programmes such as that which has taken a British group to the Russian thermonuclear laboratories turn out to be especially stimulating. These, however, are only conspicuous ways in which science is known to be larger than the sum of its national parts. The remarkable way in which the scientific communities of North America and Western Europe have been cemented together, since the war, simply by trans-Atlantic visiting is a proof that science could not continue as it has become without the free movement of scientists. If the international character of science may occasionally help to smooth the way for other kinds of international relations, that is a valuable but uncovenanted benefit.

In the circumstances, it is also proper of the signatories of the letter to imply that there was nothing reprehensible in the holding of the summer school at Spetsai. Nobody seems to have much love for the undeserving Government of Greece, but it also seems to be the case that the Spetsai conference owed almost nothing to the colonels. It is important that money is often a simple measure of propriety in circumstances like these. If a government has paid the bill for the holding of a conference, it can rightly take some of the credit for what success there may be to boast about. So does it follow that all public money is tainted? And should people travel to conferences on air tickets paid for out of their own pockets? Conferences would quickly die out if that rule were applied. The test is that public money should not be spent directly by governments on the patronage of science but, rather, given first of all to learned societies or other organizations which can be counted on to spend what funds there are without prejudice. And here, of course, it is essential that those whose presence at a conference is considered desirable should be free to attend. Briefly, a government wishing to have a conference on its doorstep must reckon to provide visas for all those whom the organizers would invite. Since the war, this has been a recurring source of trouble, and there is even now no means of knowing how successful would be some kinds of international conferences in Brazil. And would Cuban scientists be welcome to come and go from international conferences in the United States? This is a matter to which ICSU should give its attention. But in circumstances in which the freedom to come and go is established, there may be great advantages in holding conferences in hostile environments, not the least of which is that of lifting some of the sense of isolation from which members of

an oppressed intellectual community must suffer.

But what if a government should be free with visas and even tolerant of the ways in which the recipients of conference money wish to spend their funds? Is it necessary for scientists still to worry about the reflected glory which a meeting such as that on Spetsai is likely to bring? The trouble here, of course, is that the bodies of scientists which are usually concerned with the organization of conferences are not especially able at making collective decisions about the worthiness of governments. Committees are never quick and usually divided on matters not directly relevant to their existence. In the circumstances, it is unrealistic to expect that the organizers of conferences can discriminate between governments, picking the goats from the sheep. The best they can do, and the most that can be expected of them, is so to arrange their affairs that no direct benefits accrue to any government. This, to be sure, is a fierce doctrine. It would, for example, suggest that learned societies should not accept public money earmarked for purposes which are specified in detail. A general fund for conferences would be permissible, but not a gift of money for a specific meeting. Present practice is more lax than this ascetic doctrine, and the signatories of the letter on page 93 would not go as far, but there is a case for thinking that a substantial measure of self-denial by the scientific community is a part of the price which must be paid to allow the scientific community fairly to cherish its international character.

But if scientists hold governments at arm's length, is there not a danger that the coolness will be reciprocated? This will no doubt be the fear in the minds of many treasurers of learned societies, not to mention many would-be participants at international conferences. It is most probably an unrealistic fear. By now, governments have come to appreciate the value of a genuinely independent scientific community. Raising money without strings attached is a much easier matter than before the Second World War. Indeed, many governments have come to appreciate the ways in which independent learned societies can accomplish things which are beyond the reach of governmental organizations. The European exchange scheme which is being administered by the Royal Society (where the United Kingdom contribution is concerned) and by other European academies is a ready illustration of this principle. The moral of the disagreement about Spetsai is that societies and the scientific community which they represent should be less afraid than in the past of seeking and proclaiming financial independence.

#### NUCLEAR POWER

### Seeds of Doubt

THE failure of a series of small steel components in six "Magnox" reactors operated by the Central Electricity Generating Board has given the British nuclear power industry a nasty jolt. The corrosion of these

components, chiefly nuts and bolts, by the carbon dioxide gas that transfers heat from the reactor to the turbines is certainly more serious than implied by the bland statement of the CEBG that the reactors, although working at reduced power, are still producing electricity at more than the prescribed 75 per cent load factor. The plain fact is that the failure, which is one of basic design, is costing the CEBG about £25,000 a day in extra generating expenses and the situation is unlikely to be remedied for many months ahead.

Why has such a basic design weakness only now come to light? Was the design team responsible for the Magnox reactors taking a sensible risk or a wild gamble in advocating the use of these mild steel components in an environment of carbon dioxide at the elevated temperatures of the Magnox system? And what would have happened if the CEBG had not smelt a rat in its inspection of Bradwell station last year?

The CEBG is, naturally enough, taking refuge in the experimental status of the Magnox programme when it was conceived. It was accepted practice, according to the CEBG, to assume that mild steel parts would endure the thirty year life-span of the reactors without corroding, and it was only when sample baskets were removed from the Bradwell reactor last year that the possibility of a serious defect was realized. A different mild steel was involved there, but attention soon switched to the other components and the corrosion was discovered. Of the seven Magnox reactors operated by the CEBG, only the one at Berkeley, which runs at a lower temperature, was found to have escaped unscathed.

Fears that the advanced gas cooled stations may be blighted by the same trouble are thankfully unfounded. Although carbon dioxide is also used in the AGR system, the operating temperature is so much higher that completely different corrosion resistant components had to be used from the outset. The Magnox reactors may now have to be fitted with components of the same design, although it appears that the engineering factors involved in replacing or modifying the bolts, clamps and nuts have not yet been clarified. The CEBG says that it is hard to find the exact temperature conditions which are critical for the steel components because each reactor has its own particular features, and it seems that the CEBG is still groping to find a satisfactory explanation of the mishap.

Although the commissioning of the Oldbury reactor in 1968 marked what must surely be the rounding off of the Magnox programme, the disclosure of the fault has come at an unfortunate time for the nuclear power industry. The new consortia are very conscious of the need to clinch a major export contract soon, and, although both the SGHWR and AGR systems differ markedly from the Magnox design, the lack of a clear explanation for the faults can hardly bolster confidence.

There is also some doubt as to whether the CEBG has been as forthcoming as it might have been about the corrosion faults. The costs of switching the generation of 400 MW of electricity from nuclear to coal stations, as required by this turn of events, may well mount to two or three million pounds, and such sums of money can hardly be swept under the carpet without treading on somebody's toes.

## UNIVERSITIES

### University Statistics

STATISTICS just published by the University Grants Committee indicate that the total number of full-time students at British universities rose from 184,799 in 1966-67 to 200,121 in 1967-68. In the same period, the number of staff rose from 23,609 to 25,353. The 8.5 per cent increase in student numbers was therefore accompanied by an 11.5 per cent increase in the number of teaching and research staff paid directly from university funds, and this maintained the student-staff ratio at about eight to one.

The percentages of students in particular disciplines remained approximately constant during this period, except for the proportion taking arts subjects, which, reflecting the swing towards the arts in the sixth forms, rose from 20.4 per cent of the total in 1966 to 21.3 per cent in 1967. However, the proportion of women in the total reached 27.4 per cent, continuing a slow but steady upward trend, and they showed a greater affinity for arts subjects than the men did—11.1 per cent of the women and 6.0 per cent of the men reading arts subjects. But the most striking comparison is that 22.0 per cent of the men read engineering subjects, compared with only 0.9 per cent of the women, and that this percentage has remained fairly steady for the past few years. The total recurrent expenditure by the universities increased by £17.1 million to £139.5 million, while non-recurrent expenditure fell slightly from £79.9 million during the 1965-66 academic session to £79.4 million in 1966-67. These figures represent total university expenditure, towards which the Government provided £220.8 million, the rest being supplied mainly by industrial research contracts and donations. Salaries swallowed up over one-third of the recurrent expenditure, and departmental expenditure met by research grants took a further 12 per cent.

Figures for university expenditure are now published two years after the session for which they apply, and those for student numbers are one year old. It seems that the reason why they are so late is because of the difficulty in gathering the necessary information and in subsequently compiling the statistics.

## HIGHER EDUCATION

### Talks on Universities

MRS SHIRLEY WILLIAMS, Minister of State for Education and Science, met the Committee of Vice-chancellors and the University Grants Committee last week to talk over the way in which higher education should develop during the next ten years. The talks, which took place at University College, London, were chaired by Mr Kenneth Berrill, chairman of the UGC, and are described as informal by the Department of Education and Science. They are on how the universities can accommodate the expected increase in demand for places in higher education.

Official projections indicate that if children at present in primary schools are to have the same chance of getting to university as the sixth formers now, the numbers of students in higher education, about 360,000, must double by 1980. Expansion of this order is 40 per cent more than that recommended in the Robbins Report, and the DES projections