

a progressively diminishing share of the cake and a reputation for generosity as well.

In the circumstances, the abruptness of the decision two weeks ago must obviously be counted a departure from reason, not simply a manifestation of incompetence. In the weeks ahead, it is only natural that people should ask whether other decisions about the spending of scientific money will be dealt with in a similarly arbitrary fashion. It is important, of course, that the scientific community should not slip into the false belief that the Government should entirely abdicate its present power to intervene in the details of expenditure on scientific projects. The fact that British governments since the war have usually been willing to let their advisory committees spend what money is available without much interference is not necessarily a precedent for these times when budgets are much larger and when foreign expenditure is involved. The trouble on this occasion, however, is that the veto from on high has come like the proverbial thunderbolt out of the blue. One result is that it has done considerable damage—it remains to be seen whether the 300 GeV machine will ever see the light of day. In the long run, however, it is much more serious that the confidence of professional scientists in the machinery for the administration of the budget has now been deeply shaken. One result will almost certainly be that the committees on which the British Government has traditionally relied for advice will become more jealous of their rights.

## Fewer Dollars for Research

THE recent American tax increase and anticipated budget cuts may do much to help the economy, but they are causing American scientists to fear for their own economic future. In an attempt to avoid further budget cuts for basic research, some 400 scientists and educationists held a "crisis" meeting in New York two weeks ago organized by the New York Academy of Sciences. While the total amount of government funds for research has not yet declined—\$16.9 billion this year against \$16.7 billion last year—this does not even cover the annual 4 per cent inflationary increase and represents a sharp decline from the 22 per cent growth rate achieved during the ten years since Sputnik. With three-quarters of university research sponsored by government grants and the proportion reaching 90 per cent at such schools as Massachusetts Institute of Technology and the University of Chicago, any reduction of funds will have long-term consequences. Professor Linus Pauling summed up the scientists' view when he said at the meeting, "If these cuts are made in the budget even for one year, the whole economy will suffer for years to come."

No matter how large the forthcoming budget cuts are, many projects are already being disbanded. A survey carried out recently by the *New York Times* indicated a general mood of pessimism and bewilderment in university research facilities throughout the country. Physics and astronomy are the areas hardest hit, and a major factor is the cutback in programmes of the National Aeronautics and Space Agency. The Pilgrim Explorer Satellite project at Harvard University has

just been cancelled after three years and expenditure of \$1.25 million. NASA has been forced gradually to terminate its "sustaining university programme", supporting graduate students in fields related to space research. The programme has been reduced from \$100 million to \$10 million in two years, and the number of grants from 1,300 to 50 since 1966, with no new grants expected for 1969.

At the same time as the NASA cutbacks, the Defense Department had had to reduce drastically the funds allocated to basic research because of budget cuts and the practical priorities of the Vietnam war, causing a drop of \$30 million, or 9 per cent, in support of universities in the last fiscal year. Sixteen per cent of physicists in a recent American Institute of Physics survey reported they had lost all government support last year, and the figure is expected to rise to 21 per cent next year. Cuts include support from the Defense Department for radio astronomy at California Institute of Technology, University of California, University of Michigan, and the Arecibo Observatory in Puerto Rico.

The going is likely to be especially tough for graduate and post-doctoral students. The total number of scientists has increased by 20 per cent since 1965, and the competition for money and research posts is becoming increasingly severe. Federal pre-doctoral fellowships and traineeships were down by 18 per cent this year, and as long-range projects become more and more uncertain, research workers are unwilling to take on more graduate students. This is the most immediate cause for alarm for many scientists—a flow of new talent into the system must be maintained even if experiments are postponed for a few years.

The biomedical field has not been as hard hit as the physical sciences, but is beginning to feel the coming squeeze. About 40 per cent of all university research funds comes through the National Institutes of Health, but support has levelled off recently, at about \$1,000 million. There has always been a slight increase, but nothing to compare with the 15–30 per cent growth rate before 1964. "For the first time last year we had extensive shortages of funds as contrasted to approved projects," Dr James A. Shannon, head of the institute, told the *New York Times*. Many grants are being approved, but even high priority does not guarantee payment, and even when funds do arrive it is often only after long delays. Medical schools are faring no better. At the Massachusetts General Hospital, affiliated with the medical school of Harvard University, a \$1 million study of computer use in hospitals has been cut by two-thirds, a project to carry medical care into the slums is in jeopardy and the renovation of the hospital's research building has been deferred. "We may have our own type of poor people's march—and I'll be leading it," commented Dr John H. Knowles, director of Massachusetts General Hospital.

## Training Mathematicians

SHOULD mathematicians spend more time in laboratories and less in their studies composing elegant proofs? A recent Royal Society report on postgraduate training in applied mathematics, by a committee chaired by Professor M. J. Lighthill of Imperial College, thinks so. The committee concluded that all postgraduate students in this field should be exposed to some period of practical research in one field of applied