

nature of their contribution."

Next week's letter from the grants committee is expected not to go so far as to suggest that some universities should close. The emphasis, instead, will be on financial economies within existing institutions, with the recommendation that universities should think of closing departments which, for one reason or another, do not meet tests of efficiency and effectiveness. Universities and those who work in them will be especially interested in whatever arrangements the committee suggests for dispensing with unwanted members of teaching staffs.

Dr Edward Parkes, chairman of the University Grants Committee, has, however, made it clear in his evidence to a parliamentary committee that the impending cuts will not be made uniformly across the board. Universities will also be affected differently by the still uncertain enrolment of overseas students for the coming academic year. In its *Statistical Bulletin* for April, the Department of Education and Science shows that overseas student numbers declined by 7 per cent between 1979-80 and 1980-81.

Enrolments between the same two years declined by 10 per cent. Although the universities as a whole have more successfully maintained overseas student numbers than other institutions of higher education, some among them are in serious trouble, while all fear that new enrolments next October will decline further.

One part of the government's package of support for the universities has, however, been decided. The equipment grant for British universities will be increased by about 11 per cent to £76.7 million for the academic year 1981-82.

Hungarian research

Cost of elitism

Budapest

Budapest's Eotvos Lorand University is to have a new science building — at a time when the Hungarian government is drastically reducing spending in virtually every sector of the economy.

This is not the first time that the university has been promised such a building, which would unite its 44 small science "chairs" under one roof into four large departments — mathematics and physics, chemistry, life sciences and Earth sciences. Yet, in spite of the economic climate, the academics concerned are confident that this time the plans will come to fruition, because the reorganization can be justified as cost-effective. With all laboratories in close proximity, it will be possible for the various departments to share expensive equipment.

More significant in precipitating the decision, however, was the public debate on the role of the university, begun in May 1979 by the journal *Magyar Tudomány*, in which the reorganization of universities

into large departments was favoured.

One of the government's aims is to break the tradition of academic elitism. Young scientists are reluctant to leave cosy academic niches in research institutes to enter the harsher world of industry and the universities. Although the reorganization will be welcome, any real moves to strengthen the role of the universities in research would first have to deal with one of the major grievances of Hungarian scientists, the difficulty of purchasing equipment and reagents from abroad.

Because of the centralization of foreign trade, such purchases have to go through a single import-export company, which means a delay of at least six months for every order. Hard currency is not the only problem — the same delay occurs with purchases from the Comecon bloc. Only in research projects with a government priority rating — such as work on genetic engineering done under contract with the chemical industry — can the purchasing process be accelerated.

Whenever this subject is raised with officialdom, scientists say, the response is always sympathetic — but without visible result. Until the matter is resolved, however, young scientists will have one more reason for seeking a long-term post in one of the Academy of Science's numerous research institutes. For the academy has its own purchasing agency, "Akadimport", and although the delays involved are still of the order of two months, this still gives such researchers a considerable edge.

Vera Rich

Satellite-linked computers

Network planned

Several different groups in Britain are cooperating in an experiment to link computers via satellite. The idea is to demonstrate to home and overseas customers how British technology can help industry and research institutions with their communications problems. Project Universe, as the experiment is called, is being supported to the tune of £3 million for three years by the Department of Industry, the Science and Engineering Research Council, British Telecom and two private companies, GEC-Marconi and the software house Logica.

The experiment is mainly to demonstrate how groups of users such as universities and companies with offices in different centres can communicate with each other through networks of computers linked by land and satellite. Six laboratories will house rings of computers, based on a network designed at the University of Cambridge, and will be equipped with an earth-station consisting of a 3-m diameter dish a 14-GHz radio transmitter and an 11-GHz receiver. Communications within a laboratory will be via the land system and between laboratories via one channel of the European Space Agency's Orbital Test

Satellite. Each computer will be able to communicate with any other in the system initially at a rate of 1 Megabit per second.

The Department of Industry, which is providing the largest sum of money, hopes that the project will help develop technology and demonstrate uses for the network.

The two major demonstrations of the network will be in transmitting large volumes of scientific and industrial data between centres. The Rutherford Laboratory is particularly keen to use the network to transmit mask design for large-scale integrated circuits, developed with its electron beam lithography machine, to universities and industry.

The project is expected to be in operation early next year. It will run for two years throughout the rest of the life of the Orbital Test Satellite.

Judy Redfearn

Research management

Audits go on

Despite the tangle of legal threats, and claim and counter-claim over their previous — and still unpublished — work on Sir Bernard Lovell's radioastronomy at Jodrell Bank, a group of the Science Policy Research Unit (SPRU) at the University of Sussex has been given the go-ahead for its next study: CERN at Geneva.

The group is headed by Keith Pavitt, acting deputy director of SPRU, with principal researchers John Irvine and Ben Martin, who have developed what they call the method of "converging partial indicators" to assess the relative merits of scientific research groups.

Inevitably, this is dangerous territory, normally confined to the secrecy of peer review panels and referees' reports, and the Sussex group's serious attempt to arrive at objective criteria raised hackles as soon as it was applied to real cases, which included a comparison of radioastronomy groups in Britain and abroad and a study of British optical astronomy.

All these studies are now essentially complete, but none has been officially published — largely due to the Sussex group's procedure of checking its figures with the relevant laboratories first. Predictably, laboratories whose work is implicitly criticized object to either the figures or the conclusions.

The SPRU group, however, has been unable to consider such questions because at an early stage it was denied access to research council files under the "40 year rule", which controls the availability of government documents — even though the research councils are not government departments. It therefore could not assess the conditions under which one group, say, received a major grant, while another did not.

Nevertheless, what counts in the end is results, and the SPRU group claims to have a method which gives an objective assess-

ment of those results by using the relevant research community's own judgements of scientific value, both directly (through confidential questionnaires) and indirectly (through publication rates and citation frequencies).

A preliminary version of the radio-astronomy study was read last year at a closed session of the Organization for Economic Cooperation and Development, and was very well received; but the wide circulation of that paper, particularly in the Netherlands and West Germany, whose own radio telescopes were also assessed (not all favourably) led to recrimination from Jodrell Bank, which did not do so well in the study. And now North-Holland, the publisher of *Research Policy*, in which the final paper was to appear, is said to be refusing to publish the radioastronomy work.

Moreover, the originator of the SPRU study, Sussex physicist Dr Norman Dombey, wishes to have no part in such publication, and says he disagrees completely with the work, mostly done by Martin and Irvine, and its conclusions. Dombey, although a high energy physicist, will not be a member of the group for its study of CERN, and argued with the Social Science Research Council that the CERN work should not be funded. However, after nearly a year's deliberations, the council has given the group a grant for 15 months' work on CERN and its future project LEP, but has insisted this time on extremely strict rules on confidentiality.

Robert Walgate

Indian government policy

Committed to science

New Delhi

The poor coordination between Indian scientists and politicians should improve following long-awaited decisions announced by Mrs Gandhi recently. Mrs Gandhi herself is to preside over a nine-member Cabinet Committee on Science and Technology, dealing with broad policy matters, and two more science committees have also been formed.

India's worsening position on the energy front and a massive bill for oil imports have led to the formation of a six-member Alternative Energy Commission, along the lines of the Atomic Energy Commission, to be chaired by Professor M. G. K. Menon, Secretary of the Department of Science and Technology. The third committee, the Science Advisory Committee to the Cabinet, consists of 20 eminent Indian scientists from all the major disciplines. Dr M. S. Swaminathan heads this body which is to advise the cabinet on science and technology policy.

The Cabinet Committee on Science and Technology will have an important role in deciding how to spend the science and technology budget of more than 30,000 million rupees (£1,667 million) allotted in

Arnold at Christie's

An 8-day marine timekeeper which is being offered for sale on 3 June at Christie's London auction rooms is thought to be a prototype for the modern marine chronometer, and it has been suggested that the spring detent which it employs could be the earliest ever, pre-dating the putative "Earnshaw" pattern by several years. Made by John Arnold in London around 1775, the design of this un-numbered chronometer throws light on the many problems which confronted Arnold in his efforts to construct a timekeeper which would be accurate and reliable and could also be made in quantity at a relatively low price.

His chronometer (a term he himself coined) was designed to keep the same rate of going in every position and it incorporates a mechanism to compensate for changes in temperature. It has a three-armed uncut brass balance 45.2 mm in diameter. Regulation is by flat spiral balance spring, regulated by curb pins carried on a bi-metallic compensation curb, concentric with the balance pivot. The convex enamelled dial bears the signature "Arnold, London". His earliest dials were enamelled, but once commercial production was started, he changed over to silvered dials. The box, 6½ inches square and 3½ inches deep, is of mahogany.

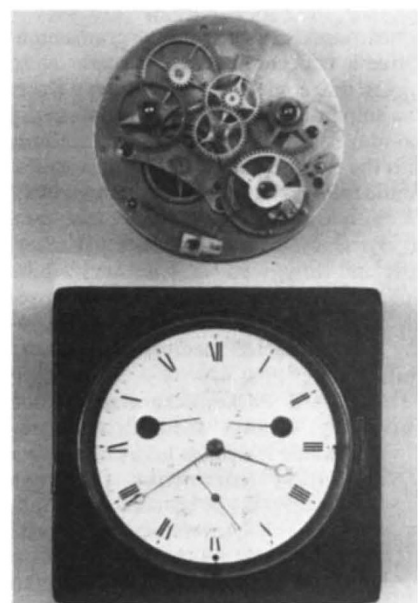
Arnold first started working on marine timekeepers in 1786, about nine years after John Harrison — the carpenter turned clockmaker — had submitted his No.4 timekeeper to the Board of Longitude. This was a body which had been set up by the British government and which in 1714 offered a prize of £20,000 for a machine which would enable longitude at sea to be determined to a specified degree of accuracy. Harrison richly deserved the prize but the board shilly-shalied for many years, and it was only towards the end of his life that he received the final instalment of the award.

the country's sixth five-year development plan. Main areas of interest will be in life sciences, oceanography, alternative energy sources and bioengineering as applied to pharmaceuticals.

Naresh Sahajpal

● **Energy alternatives:** The Indian government has given fresh impetus to the development of new and renewable sources of energy. The key point of the plan is reduced dependence on imported oil. The government is investing in systems for utilization of energy from the Sun, wind and biomass.

In photovoltaics, the public sector company, Central Electronics Limited (CEL) of Sahibabad, has begun bench-scale manufacture of single crystal silicon solar cells and panels with capacities of up to 10kW per year. Solar modules developed by CEL are already being used in



Had the Board of Longitude a free choice between the Harrison and Arnold timekeepers, the Arnold might well have been chosen on the grounds that it was less complicated and consequently easier to produce. Arnold made chronometers for the Admiralty at 60 guineas a piece, much cheaper than Harrison's which took about 3 years to make.

Arnold deserves much of the credit for introducing into England the manufacture of chronometers on a large scale.

As for the price likely to be reached when the chronometer is auctioned, Christie's are not willing to speculate. But if the device's history can be authenticated it could fetch anything between £20,000 and £100,000.

Arthur Frank

Mr Arthur Frank, the now-retired owner of a Glasgow-based optical business, is a well known collector of optical and scientific instruments. Much of his collection, which includes early telescopes, cameras and eyeglasses, is now distributed among several British museums. Mr Frank will be contributing occasional articles when important scientific instruments change hands or come onto the auction markets.

powering a light beacon at Dwarka port, pumping water for a whole village in Rajasthan and lighting a 20-bed hospital in Ladhak. Solar water heating systems are being installed in many hotels, and a textile mill in Ahmedabad is already meeting its hot water requirements through a large solar heater.

A 120 million rupee (£7 million) project has been drawn up for developing low cost solar-grade silicon material and cheap fabrication techniques and for improving the efficacy of solar cells and solar panels.

A national wind energy centre is being set up at Allahabad Polytechnic to develop a low-cost windmill. A cold storage plant utilizing geothermal energy is being set up in Himachal Pradesh. And a 600 MW tidal power station is planned in the Gulf of Kutch in Gujarat.

Zaka Imam