supported by ODA.

British policy is to cut multilateral, special programme aid hardest, for the government's aim is to maintain direct core subscriptions to international agencies (such as the World Bank and the United Nations Development Programme), while stressing bilateral aid which is inevitably under closer British political and economic control. **Robert Walgate**

Armadillos fight leprosy

The safety and ethics panel of the World Health Organization (WHO) is likely to agree within the next few months on immunization trials with a new leprosy vaccine made from the liver and spleen of infected armadillos. The trials would be conducted from January to September 1982 in the United States, United Kingdom and Scandinavia to avoid criticisms of uncontrolled drug testing in third world countries.

The objective will be to induce 85–90 per cent immunity to the causative agent of leprosy (*Mycobacterium leprae*) as judged by immune reactions to lepromin, a preparation of killed *M. leprae* obtained from infected human ear-lobes.

The vaccine has been a long-standing objective of the WHO Special Programme for Research and Training in Tropical Diseases (TDR). The snag is that it depends on culturing the bug in armadillos, whose low body temperature allows growth of the organisms, and some have questioned whether it will ever be possible to breed enough armadillos to vaccinate the 2,000 million or so of the human population potentially at risk.

Dr Barry Blum of the Albert Einstein College of Medicine in New York, who heads the TDR leprosy immunization project, says, however, that armadillos are such prolific generators of *M. leprae* that the numbers should be sufficient. A mixed vaccine made from human tissue yields immunity with a single dose of 6×10^8 killed bacteria. An armadillo three years after infection produces about 2.5×10^{12} bacteria in the liver and spleen. If the vaccine produced from them is as effective as the human one, each armadillo should yield 4,000 doses. WHO now has 250 animals used for research and the forthcoming trial, but there is a population of 10 million armadillos in the southern United States.

The adequacy of the supply depends directly on the dose required to produce immunity. One shot must be 85–90 per cent effective to avoid the need for repeated injections. The availability of the vaccine would also depend on the efficiency of extraction from armadillo tissue, a problem which has been given to the Wellcome Laboratories in the United Kingdom to resolve. Then leprosy is such a slow-moving disease that proof in the field against infective organisms will take ten years. **Robert Walgate**

US solar energy

No silver lining

Washington

The Solar Energy Research Institute at Golden, Colorado, has been flung further into limbo by the arrival of the new Administration, which is now trying to respond to a demand from the General Accounting Office that the objectives of the institute should be spelled out. Most probably the institute, once the spearhead of President Carter's ambition that a fifth of United States energy consumption at the end of the century should be solar energy, will be asked to concentrate on long-term research, abandoning the commercial demonstration of solar energy devices. The present budget of $130 million is likely to be cut by a half, and between 100 and 200 of the present staff of 770 will probably lose their jobs.

The brief history of the institute, set up in 1977 and managed for the Department of Energy by the Mid-West Research Institute of Kansas, is a tale of muddle. Originally, there was to have been a staff of 1,200 engaged on long-term research, development and the commercial demonstration of devices able to win energy from the Sun. In part, the institute has been the victim of the success of some applications of solar energy. Solar water heaters, large and small, and small hydroelectric plants are multiplying throughout the United States — the Department of Energy is embarrassed by more than 1,000 applications from private companies and individuals to build hydroelectric plants. With the Administration committed to the view that commercial developments should be the responsibility of commercial organizations, not the government, the institute's demonstration programme has become vulnerable. So much seemed clear during a visit to Golden by officials of the Department of Energy last month.

Even when the axe falls, in the next few weeks, the rump of the institute is unlikely to be reassured about its future. Although the institute is now nearly four years old, the special building (on a 300-acre site offered by the Government of Colorado) seems as far off as ever. In a sharp letter to the Secretary of Energy at the end of April, the General Accounting Office asked that further design should be postponed until the department had decided what the long-term role of the institute should be, and that even the use of the 300-acre site for experimental rigs should wait on this definition. One snag is that the offer of the site expires in April 1982.

The letter is scathing about the planning of the building. Although authority for a laboratory was included in the 1974 Solar Energy Act, the estimated cost of $132 million (in 1978) was an unwelcome surprise. Successive Secretaries of Energy have sought to limit the cost of the buildings to $98 million (in 1979) and $75 million (in 1980). The General Accounting Office points out that the original scheme for making the building 80 per cent self-sufficient in its own energy requirements was based on the use of active and passive solar power devices which had not been proved and which were not all cost-effective. Meanwhile the institute's staff camps out in rented office accommodation costing $5 million a year, and has spent substantial sums on the conversion of offices to laboratories.

Since 1977, the institute's research programme has been trimmed by the removal of general responsibility for the exploitation of biomass, but it remains responsible for the use of methanol as a liquid fuel — a motor vehicle driven by hydrogen derived from the catalytic decomposition of methanol will be demonstrated later in the year. The institute is also confident that it will be able to produce silicon-based solar cells yielding power at a cost of 70 cents per watt by the end of this decade, roughly a tenth of the present cost of solar cells.

European Space Agency

Delays in space

For the second time this year, the European Space Agency (ESA) may be hamstrung by a change of plans within the United States National Aeronautics and Space Administration (NASA). This time, the possible casualty is Spacelab, ESA's manned space laboratory due to be launched on the space shuttle. Spacelab's first flight could be delayed, or its success reduced, if the Department of Defense persuades NASA to modify and thus delay the launch of the second of the two satellites intended to form the basis of a new data collection system.

The Tracking and Data Relay Satellite System (TDRSS) will eventually replace much of the worldwide network of tracking stations for relaying data from the space shuttle and satellites in low Earth orbit. Two tracking satellites, to be launched into geosynchronous orbits from early shuttle flights, were to transmit data from almost any position in a low Earth orbit to a central receiving station at White Sands, New Mexico. The original plan was to launch the first tracking satellite on the sixth shuttle flight, the second in June 1983 and Spacelab itself in September 1983. But now the Department of Defense has asked that extra coding should be built into the second satellite which could delay the launching until after that of Spacelab. One possibility is that the first Spacelab flight would be brought forward to June 1983 and the second tracking satellite launched only in September 1983.

If NASA accedes to this request, ESA would have the choice of either flying the first Spacelab payload with only one tracking satellite in service or of delaying the flight until the spring of 1984. One

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All aboard for Halley

The planned Soviet–French joint mission to Halley's comet in 1986 has been transferred, on the initiative of the Soviet Union, to the joint Comecon "Interkosmos" programme. At the same time, French participation will be largely reduced to the first stage of the mission, the fly-by of Venus.

The Halley probe is now to carry apparatus from Comecon countries, although their participation seems to be confined to the provision of equipment rather than the design of any individual experiments. Some countries may be assigned an individual responsibility for various sections of the mission — Hungary, for example, has been entrusted with developing the television system for monitoring the comet and transmitting the pictures to Earth.

The announcement of the Interkosmos trip to Halley's comet came at last month's meeting in Erevan of the Comecon permanent working group on space physics, only a few days after the successful landing of the Romanian cosmonaut, Dumitru Prunariu, brought to an end the programme of Comecon participation in missions to the Salyut space stations. Academician V.A. Kotel'nikov, chairman of Interkosmos, confirmed that no further joint manned flighs have been planned, although several unmanned joint missions are scheduled.

Vera Rich

tracking satellite would be able to cover the shuttle only in about half of its orbit and one third of Spacelab data could be lost. Extra recording equipment would be carried on board, but it is unlikely that the very high rate of data (100–150 megabits per second) from the microwave facility for Earth observations could be recorded. Spacelab users and ESA await NASA's final decision.

Meanwhile, NASA has been revising its schedule for shuttle flights up to 1985. Surprisingly, after the almost complete success of the first shuttle flight, delays are in store. Seven of the 44 flights scheduled before 1985 are to be postponed until the second half of the decade or even cancelled. Most other payloads are to be delayed. The reason for the delays, ranging from a few days to more than a year, are cuts in the Reagan budget, a more accurate estimate of the turn-round time and, most recently, delays in the manufacture of lightweight external fuel tanks. NASA says that delay in delivery of the tanks is largely responsible for the postponement of seven flights beyond 1985.

Three of the seven flights will effectively be cancelled. One will be saved by launching the two Galileo probes to Jupiter, more than 400 days later than originally planned, on a single shuttle flight. Another has been saved by the cancellation of the Venus-orbiting probe. And the third may be saved from the International Solar-Polar Mission if NASA fails to win approval for even a modified solar-polar spacecraft. (The ESA solar-polar spacecraft is included in the shuttle manifesto but with a launch date of May 1986, more than a year later than originally planned.)

Foreign and commercial users affected by the latest shuttle delays are being given until the end of this month to decide whether they would like to use Thor Delta launchers instead.

Judy Redfearn

European innovation

Brokers in demand

Luxembourg

The role of the European Commission in creating the right environment for innovation came up again at a symposium — sponsored by the Commission — in Luxembourg last week. The three-day conference was inspired by the resolution of EEC science ministers at the end of 1979 and follows on from a similar symposium on banking and innovation held last year.

Despite the ritual homage paid to the idea that small business will make good the job losses in large companies and industries, this year's symposium highlighted the gap between the researcher and the businessman. Participants repeatedly affirmed that basic and pure research in Europe too often fail to lead to commercial application.

The implication is that the dynamism of the small American business is not so easily copied in Europe. Not only is there a lack of venture capital but linguistic differences, the small size of national markets and technical barriers are further deterrents. In addition, the sheer mass and variety of the channels through which research results are made available bewilder rather than inspire industry. So this symposium edged round to the conclusion that what is required is a broker or intermediary who could select exploitable research and help to develop it commercially.

Some effective middlemen exist. In the United Kingdom, the National Research Development Corporation was set up in 1946. The Netherlands has the Eindhoven University of Technology, which has helped 200 small and medium-sized businesses in its first year of operation. In Austria the Innovationsgesellschaft is a venture bank specializing in helping inventors to launch new products. Belgium has several industrial research parks at the Catholic University of Louvain-La-Neuve and Vrije Universiteit Brussels.

The consensus of opinion at the symposium, however, was that these innovations are inadequate. One suggestion was for a European Technology Transfer Centre, another for a European Investment Bank specializing in research. Others proposed more bulletins on the lines of the French *Lettre des Sciences et Techniques* which selects and condenses reports of new discoveries. Many participants argued that the mentality of scientists in the field needs changing. They should publish information less for their peers than for the end user. Or they should themselves become entrepreneurs. The Commission will now consider how best to create the environment for the scientist/entrepreneur and for a European context for the scientific information broker.

Coincidentally, the European Commission's proposals for EEC programmes in the field of new technologies — microelectronics and telematics — are to be reexamined with greater interest, said Mr James Prior, the UK Secretary of State for Employment, after an unprecedented gathering of the EEC's finance and employment ministers in Luxembourg on 11 June with the aim of finding a solution to the growing unemployment problem. Sir Geoffrey Howe, the British Chancellor of the Exchequer, has also stated that the Commission is to bring forward new proposals to stimulate the expansion of small and medium-sized businesses.

If Mr Prior's words at the "Jumbo Council" are to be taken seriously, the Commission's work in the area of scientific communication is likely to be given a shot in the arm. The ministers agreed that there must be a greater coordination of the EEC's approach to new technologies.

Jasper Becker

Soviet scientists

Another trial

Dr Viktor Brailovskii, the Moscow cyberneticist faces trial this week on a charge of "disseminating fabrications . . . which defame the Soviet political and social system". Dr Brailovskii has refused a defence counsel, maintaining that nothing in his conduct over the past few years needs to be defended in court.

Dr Brailovskii was dismissed from his lectureship at the Moscow Radiotechnical Institute in 1972 when he applied, with his wife and son, to emigrate to Israel. In 1973, he and his wife Irina joined the "Sunday seminar on Collective Phenomena" organized by their friends, Dr Aleksandr Voronel', for "refusnik" scientists who wished to keep up some sort of intellectual life during the waiting period between applying for a visa (and subsequently losing their jobs) and actually being allowed to emigrate. From then on they were both frequently subjected to police harassment, which intensified when Dr Brailovskii became organizer of the seminar following the departure of Voronel' and his successor Dr Mark Azbel' to Israel.

In 1976, Dr Brailovskii was given permission to emigrate but his wife was refused on the grounds that she had access to secret information. (Her former

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