

## Bangladesh sets up institute of nuclear agriculture

THE Vice-President of the Bangladesh Republic officially inaugurated the Institute of Nuclear Agriculture (INA) last month. This Institute, set up in collaboration with the International Atomic Energy Agency (IAEA), is the fourth large one of this kind to be built. The others are in Yugoslavia, India and Brazil. The Institute has been established in the premises of Bangladesh Agricultural University with the objective of identifying and solving the basic agricultural problems of the country through interdisciplinary approaches employing both nuclear and conventional techniques.

Agriculture is the mainstay of the Bangladesh economy. Farm products alone account for about 55% of the Gross Domestic Product (GDP), so the importance of boosting productivity can hardly be over-emphasised at a time when the country is facing the joint problems of food shortage and a fast growing population.

The initial research programmes of the Institute are in plant physiology, plant genetics, soil science, and ento-

mology, with emphasis on improving varieties of rice, jute, wheat, pulses, tomato and oil seeds. INA has already achieved some encouraging results in evolving new rice varieties, such as IRRATOM-24 and IRRATOM-38 through irradiation technique. They are capable of higher yield and early maturing than mother variety IRRI-8. Similarly, the two new strains of jute known as ATOMPAT-8 and ATOMPAT-38 have been found superior to the mother, D-154.

Mr Hedio F. S. Bittencourt, Deputy Director General of IAEA, addressing the inaugural ceremony said that the application of nuclear techniques in agricultural research was by no means a luxury for the developing countries; it was the base proven method for solving certain practical problems of agriculture.

The Swedish International Development Agency (SIDA) has provided a grant of over one million US dollars towards the cost of equipment, advisory service and fellowships, IAEA being the executive agency.

M. Kabir

## Less paper, more money for US scientists

DR FRANK PRESS, director of the US Office of Science and Technology Policy, has launched a major campaign to encourage Government agencies to reduce the amount of time that university scientists receiving federal support are required to spend on paperwork.

Speaking in Washington last week, Dr Press said that the money that could be saved in this way might amount to millions of dollars for every university.

"One of the goals of this administration is to make universities perform better the basic research which the government subsidises. One way of reducing paperwork and overheads, for example, would be to award longer-term grants, so that scientists do not have to be writing new research proposals every three months or so."

Dr Press said that the Department of Health, Education and Welfare, which is responsible for the research carried out by the National Institutes of Health, is already looking at ways in which it can help universities by reducing paperwork and streamlining regulations about grants.

"I have also written to NASA (the National Aeronautic and Space Administration) and to NSF (the National Science Foundation) asking them what their plans are on this," he said.

Dr Press said that, under the current legislative framework, the administration could not guarantee support for a particular research project over a two or three year period, since the research budget had to be approved annually by Congress.

"However we can say to someone that we intend to support his work for a given number of years, and that if he or she sends in a report on the progress of his work at the end of each year which is satisfactory, we will agree to further funding." The Science and Technology committee of the House of Representatives is already looking into the possibility of multi-year authorisations as a way of stabilising the research-funding process, he said.

Dr Press also said that although there was little support in the administration for setting up a Department of Science, there was growing interest in establishing a Department of Technology and Industrial Development.

"Many countries, such as Germany, England, France and Australia, already have such ministries. This could be an interesting direction for the administration to go, particularly since there is an increasing sensitivity at Cabinet level to the problems of industrial innovation."

David Dickson

## The facts about Kosmos-954

RECOVERY of the fragments of Kosmos-954 is proving, not surprisingly, a lengthy operation, and although some sizeable pieces have apparently been located and taken for examination to White Shell, Manitoba, it may be some considerable time before any hard facts are available about the type of satellite and reactor actually involved. Although the figure of 50 kg U-235 has been tossed around fairly freely, this is simply an assumption the reactor involved was of *Romashka* type. This is the only Soviet reactor of comparable type ever described in open publications; accordingly, it is the only basis for speculation. The *Romashka* has a 40 kW thermal yield and was, indeed, designed for space use, and assuming that such reactors are still used aboard certain Soviet satellites, it is possible to work out tentative figures for radiation hazards for this, and possible future, satellite crashes.

Three scenarios have been discussed among the experts. The first—break-up of the satellite in the stratosphere—requires the use of additional data. This comes from the US Navy SNAP-9A, powered by a plutonium source, which disintegrated before entry into orbit in 1964. On this basis, assuming an initial charge of 50 kg U-235—and 100 days in orbit before disaster, one arrives at the comforting figure that six months after the incident the residual radioactivity would be of the order of  $10^{-9}$  of the International Commission for Radiological Protection safety level. (This is the concentration of airborne radioactivity that could be breathed 24 hours a day without harm.)

For break-up on impact, the downwind distance to which the UK Medical Research Council emergency reference levels extend works out at the order of a few km. (This means in effect that beyond this distance the hazards of mass evacuation are considered to be greater than the risk from radiation). For impact in one piece, if no chain reaction occurred, initial radiation levels would be expected of 1 rad/h at 200 m from the site, 100 millirad at 500 m, 10 millirad at 1500 m. Had the impact occurred in a populous area, evacuation would have been necessary up to 2km, if no intervening shielding (e.g. masonry) were present. Chain reaction is unlikely, since the mass of uranium used in such satellites is normally subcritical, and special methods, e.g. a reflector, must be used to keep sufficient neutrons within it to maintain a chain reaction. Such a reflector would virtually certainly become



detached and destroyed during uncontrolled descent.

However comforting or worrying these figures, there is no doubt that the gloomy prediction of Ecclesiastes that "they shall be afraid of that which is high" has taken on a new and urgent meaning. President Carter has already expressed his willingness to be a party to a treaty banning the use of reactors from orbit. For the Soviet side, Academician Leonid Sedov has said in a TASS interview on Soviet radio that the errant satellite was in no way the "flying nuclear bomb" which some "absurd rumours" would make it. There were not and could not be any weapons aboard, he said, and those who spread such tales were trying to undermine the basic principles of international cooperation in the exploration and peaceful use of outer space.

In spite of Sedov's reassurances, it seems likely that Kosmos-954 did have certain military potentialities. Technically, it was a low orbit satellite for ocean surveillance. The presence of a reactor aboard (as opposed to a weaker isotope source) implies the use of powerful radar for monitoring ship movements, which would suggest that the terms of reference of the international agreements on the peaceful uses of both space and atomic energy were being somewhat stretched. Any future agreement on reactors in orbit might well have to re-examine the definition of 'peaceful' in this context.

Doubtless as a further reassurance, Sedov presented the official Soviet view of the accident: a sudden depressurisation of the satellite while beyond the range of Soviet tracking facilities. Since depressurisation was so rapid, it is assumed that Kosmos-954 collided with "some other object of natural or artificial origin".

Strangely, Sedov gave the significant date as January 6—the date of the "depressurisation". Yet according to US observers, the satellite was already misbehaving on December 17. The two reports are not incompatible—if the satellite was already out of control, it might well have come into contact with some other artificial object or debris which it normally should not have encountered. This, however, is not Sedov's story: he maintains that the on-board systems became inoperative only as a result of the January 6 impact—one more minor mystery to add to the story of Kosmos-954.

One fact, however, has already emerged quite clearly—the cost of the search and recovery operations. According to Canadian Prime Minister Pierre Trudeau, by last weekend this had reached one million dollars and was rising daily.

Vera Rich

## Britain's big science on the baseline

AFTER four months in office, Professor Geoffrey Allen, Chairman of the UK's Science Research Council (SRC), is pleasantly surprised that the Advisory Board for the Research Councils (ABRC) is not as hostile to basic science as he had been led to believe by his predecessor, Sir Sam Edwards.

Professor Allen, speaking at a British science writers' luncheon, said that in spite of the proposed 1.7% annual cut in the SRC's budget over the next four years, announced with the science vote last month, the outlook for science in the UK is looking slightly up. His cautious optimism is founded on the ABRC's decision to award the SRC greater shares than it could expect, in proportion to its annual expenditure, of the extra £4 million added to the science vote last October and of the £4.5 million to be spent on capital work in 1978/79.

A beneficiary of that optimism could be 'big science', long since neglected for research designated of national importance. "Nuclear physics, astronomy and space research have been battered" admits Professor Allen. For nuclear physics, in particular, he agrees that funding is now at the minimum viable level—almost. "We've nearly reached the baseline" he says, "which we must maintain to support a UK presence in nuclear physics".

And Professor Allen seems determined to have a say in the fate of British nuclear physics. Last December, he was at his own request appointed to the Council of the European Centre for Nuclear Research (CERN) in Geneva, now the major recipient of Britain's funds for high energy physics. He has already expressed his view that CERN's annual budget should be planned to remain at a plateau of about Sw Fr 560 million. The budget for 1978 is Sw Fr 615 million and many countries would like to see future budgets stabilise at about Sw Fr 600 million.

Not all British nuclear physicists, however, are in agreement with Professor Allen's baseline. Dr G. Stafford, Director of the UK Rutherford Laboratory thinks that a Sw Fr 560 million budget at CERN "will mean losing out on basic experiments". Such a low sum, he claims, "takes no regard for future development. By the 1980s existing machines will be old and at that level of funding we would not be able to replace them". On one point, though, Allen and Stafford do agree; that if future projections for the total UK nuclear physics budget are met, involving a 25% cut in spending over

the next five years, then there would be insufficient funds for a home-based programme and UK nuclear physics would be at an end. Stafford feels that the funding is at an absolute minimum.

The fate of high energy physics, however, is being pursued on another level. At the end of this week, Shirley Williams, Secretary of State for Education and Science, and a powerful lobbyist for the interests of scientists in the UK cabinet, will visit CERN.

The state in Britain of the other big science—astronomy and space science—is perhaps not quite so critical as that of high energy physics. Provided that there is no large cutback in funds over the next few years, radio astronomers should be able to maintain a competitive programme. Plans for a millimetre-wave radio telescope already have SRC approval: all that is now needed is Treasury approval for the £4.5 million it is likely to cost. And Jodrell Bank has plans to go ahead with extending its multi-telescope interferometer at an estimated cost of £2 million.

In astronomy it is the X-ray astronomers and space scientists who are showing most concern over their futures. Professor Ken Pounds of Leicester University claims that British X-ray astronomy is in a "fairly critical state". Its international reputation is higher than it has ever been but the prospects for the future are poor unless funding can be maintained at least at the present level. "If the UK is to get the best out of its subscription to the European Space Agency (ESA), then it must have a comparable home programme". But ESA can only fund one major new project in any particular discipline every two years, so each discipline is catered for approximately once every ten years. At the moment, for example, ESA has only one satellite for X-ray studies, EXOSAT. Therefore the UK must be able to bid for space on other satellites including NASA's Space Shuttle. This means maintaining a home based programme to the tune of £5.6 million.

Professor Allen's concern, however, is not entirely with the problems of 'big science'. He sees as one of his immediate priorities "making Sam's plans succeed" by continuing to give special attention to areas of national importance including microelectronics, marine technology and polymer engineering and making sure that schemes to improve collaboration between industry and universities are implemented.

Judy Redfearn