

lethal vary from about 200 roentgen units for mammals to 200 000 r or more for unicellular organisms. Variations in sensitivity have also been noticed between different micro-organisms as well as between different mammals. While these variations have been known for a long time, no convincing reason has yet been put forward to explain them. In fact, scientists have found it difficult to offer even a tentative explanation. The matter, however, is of basic importance, because an understanding of the reasons for these variations may provide a clue to some of the fundamental problems of radiobiology. Only when the reasons for the variations are clearly known will it be possible to base methods of radiation protection on a reliable foundation.

A contract has been placed with the Chester Beatty Research Institute in London for research on the reasons for the variations in the radiosensitivity

of different micro-organisms. Apart from its value in fundamental radiobiology and radiation protection, this research may also have a bearing on the possibility of preserving food and drugs by irradiation. One of the chief problems in the sterilization of food and drugs has been that many bacteria possess a high level of resistance to ionizing radiation. In some cases, the dosage required for their destruction may prove harmful for the food or drug itself. Experience so far has shown that sterilization may require between 200 000 r to 600 000 r. One possible solution, therefore, is to find a method of increasing the radiosensitivity of bacteria by some artificial means before they are subjected to radiation, so that a low and safe radiation dose may prove completely effective. One of the objects of the research being carried out at the Chester Beatty Institute is to examine how micro-organisms can be made more sensitive to radiation than they normally are.

EDUCATION FOR THE ATOMIC AGE

The rapid development of the peaceful uses of atomic energy has necessarily led to an increasing demand for manpower trained in the various branches of nuclear science and technology. The expansion of education and training in these fields has not always been able to keep pace with the steady rise in demand, and many countries have been faced with the problem of an acute shortage of trained personnel.

Even among those who receive a general scientific education or technical training, there are not many who can undertake the highly specialized work that has to be performed in the field of atomic energy. Again, atomic science and technology itself consists of a number of specialized disciplines. The greater the specialization, the more acute is the shortage of personnel with adequate knowledge and training.

Training in nuclear science and technology is one of the major problems that are being tackled by the International Atomic Energy Agency. But obviously a problem of this magnitude cannot be solved solely by the direct effort of international organizations; its solution would call for the concerted effort of every nation interested in the development of atomic energy. Besides, there must be a suitable educational base for the success of any kind of advanced training. In other words, general educational institutions will have to complete the groundwork that must precede any kind of specialization in nuclear science and technology.

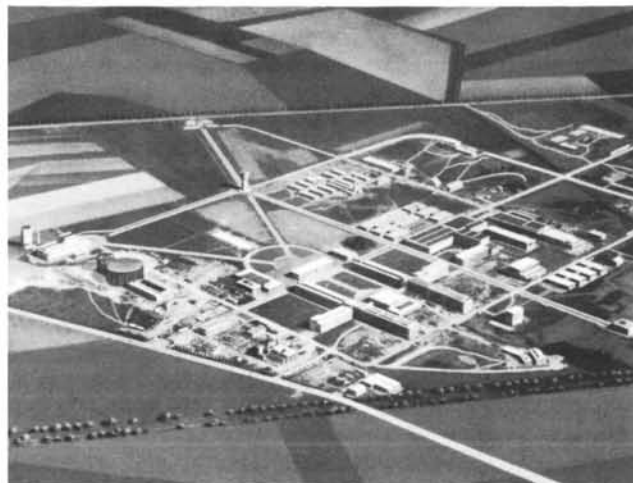
The problem is thus enormously complex and ramifies into diverse aspects of educational policy. For example, it may have some bearing on the relative emphasis to be given on science in the early stages of general education. Further, it may necessitate

some re-orientation of the content and methods of traditional science education at various levels.

Saclay Seminar

The need has long been felt for an exchange of expert views on the subject, for a detailed discussion of the problem as a whole. This was recently done at an international seminar organized jointly by IAEA and UNESCO, the two international bodies which have major responsibilities in this field. Distinguished scientists from 31 countries attended the seminar which was held at the French Nuclear Research Centre

A general view of the Nuclear Research Centre, Saclay
France



at Saclay from 6 to 10 July 1959. Twenty-eight papers were presented at the seminar. The authors of these papers as well as those who took part in the discussion on them had had valuable experience in important fields of teaching and research and were, therefore, able to speak from an intimate knowledge not only of the requirements of atomic energy work but also of the specific problems of education, research and training.

The opening session of the seminar was addressed by the Director General of IAEA, Mr. Sterling Cole, the acting Director General of UNESCO, Mr. Malcolm Adiseshiah, and the High Commissioner for Atomic Energy in France, Professor Francis Perrin. There were four main sessions. The first, which dealt with the role of the Universities in nuclear education, was presided over by Professor Glenn Murphy of the Iowa State University, USA. The second was concerned with education in nuclear technology in the engineering colleges; Professor Jack Diamond of Victoria University, Manchester, UK, was chairman of this session. The third session, at which the chairman was Professor Bertrand Goldschmidt, Director of the Departments of Programmes and External Relations, French Atomic Energy Commission, discussed the education and training methods at nuclear research centres. The fourth session, which was devoted to the role of international organizations in this field, was presided over by Professor A. N. Rylov, Deputy Director General of IAEA in charge of the Department of Training and Technical Information.

Panel Discussions

The four main sessions were complemented by panel discussions on (a) nuclear education at the secondary school level, (b) nuclear education at the advanced University level, (c) training in health physics, and (d) special problems. Most of the participants took an active part in these discussions. In the panel on special problems, the subjects discussed included the need for specialization and the stage where specialization should begin. There was almost complete agreement on the need for improving the general scientific background of students and introducing the fundamental principles of nuclear physics in the teaching of general science.

During the seminar, the participants were shown round the Saclay Nuclear Research Centre. They also visited the French National Institute of Nuclear Science and Technology, where the available facilities and training methods were explained by the Director of the Institute and the Research Centre, Professor J. Debieesse.

Those who took part in the Saclay seminar expressed the hope that the work done at the seminar would be continued in some way, possibly through a special committee or by other suitable means, within the framework of IAEA and UNESCO. The papers presented at the seminar as well as the records of discussions will be published jointly by these two organizations.

POWER PROGRAMMES REVIEW

The following is the second in a series of articles on nuclear power programmes in the Member States of IAEA. Each issue of the Bulletin will carry a factual report on the programme of one Member State

NUCLEAR POWER FOR INDIA

India will require a substantial increase in the generation of electrical power to meet the demands of her developing economy. A survey of available resources has been made in the context of development envisaged under the country's five-year plans and it is felt that atomic energy will have to be used in increasing quantities to supplement conventional fuel resources in order to attain the anticipated power targets in the next two decades.

It has, therefore, been decided that a small beginning will be made with the erection and commissioning of an atomic power station of 250 MW (electric) capacity by the end of 1964. The installation of a further 750 MW of nuclear power by the end of the third five-year plan period, i.e. by March 1966, is under consideration. At the IAEA General Conference last year, the Chairman of the Indian Atomic Energy Commission, Dr. Homi J. Bhabha, said: "It

is very probable that this minimum (250 MW) will be doubled, and not unlikely that it may be raised to a million kilowatts."

At present, preliminary steps are under way for the selection of a site and preparation of specifications for the first nuclear power station. A decision on additional power stations during the third five-year plan period may be taken in the near future.

This is a programme of considerable dimensions, and it will be the beginning of a much bigger programme for the utilization of India's vast thorium resources for the generation of power. To realize why India is embarking on a programme of this magnitude, one must examine the present pattern of the country's power demands and supply, the likely rates of growth, the extent to which the growing demand can be met by sources other than nuclear energy and the conditions