

# ASSISTANCE TO LIFE SCIENCE STUDIES IN ARGENTINA

Two experts provided by the International Atomic Energy Agency have helped in the development of different branches of life science studies in Argentina. One of them, Dr. George E. Stapleton, of the Oak Ridge National Laboratory, USA, spent about a year (October 1960-September 1961) in Argentina as an IAEA technical assistance expert in the field of radiomicrobiology, while the other, Dr. Norman Veall, of Guy's Hospital Medical School, London, was assigned to that country for about two months last year to assist in developing radioisotope applications in medicine and biology.

The reports submitted by the experts, which have been communicated by IAEA to the Argentine Government, describe the types of work initiated or established with their help and contain a number of specific recommendations for further development. While many of the points made in the reports are of interest mainly to the Argentine authorities, and to the Agency which provided the services of the experts, some of the information given in the reports is likely to be of wider interest.

## Radiation Effects on Micro-organisms

Dr. Stapleton was sent to Argentina in response to a request from the Argentine Government for the services of a microbiologist with experience in studying the effects of ionizing radiation on micro-organisms and in the testing of protective compounds against radiation damage. The expert was to assist in setting up a radiomicrobiological laboratory in the Department of Biology and Medicine of the Argentine National Atomic Energy Commission (CNEA) and train professional and technical staff for the laboratory. He was also to conduct theoretical and practical courses in radiobiology at the Faculty of Science of the National University of Buenos Aires.

In his report, Dr. Stapleton points out that the basic purpose of the assignment was to establish a type of radiation biology which had not hitherto been exploited in the country, and it is apparent that there is a real future for investigations in radiobiology at the cell level.

He has also noted that there already exists among the various biologists at the CNEA general research interest in "factors that influence the radiosensitivity of biological material".

It has been established for some time that relatively simple changes in the growth conditions of micro-organisms can drastically change the sensitivity of cell populations to radiation. Chemical

analysis of the different cells gives no clue to the explanation of the altered sensitivity. It is clear from the results obtained, says Dr. Stapleton, that the explanation lies in the physiological activity of the cells, especially that concerned with the relative ability of cells to repair the damage brought about by radiation.

Under Dr. Stapleton's guidance, a group of Argentine scientists began investigating this problem, the specific field of enquiry being concerned with the physiological determinants of radiation sensitivity of micro-organisms. Most of the investigations carried out during Dr. Stapleton's stay in Argentina involved the study of alterations in the lethal effect of radiations; it was then important to determine whether or not similar alterations are found as far as the genetic material of the cells is concerned. It is clear, says Dr. Stapleton, that there are also changes in the frequency of genetic mutations as a result of changes in the growth medium, but to a lesser extent than those seen in the lethal effect. He adds: "We are encouraged that we may be able to locate specifically the systems involved in the biological repair processes."

The investigations could not be completed during Dr. Stapleton's stay in Argentina, and it was planned to complete the work as a co-operative effort of the laboratories of the CNEA and those of the expert when he returned to his home post. At the beginning of Dr. Stapleton's assignment, two CNEA laboratories were assigned to his research group, and when he left, a third was under construction. Dr. Stapleton is of the view that with some rearrangement of the equipment in the three laboratories, they will be among the best equipped laboratories, for the type of investigations carried out, in the whole of Argentina. There are plans to add to the equipment annually, especially in relation to basic biochemistry.

Dr. Stapleton gave two series of lectures, one to students at the Institute of Physics in San Carlos de Bariloche and the other to students of biology of the University of Buenos Aires. He also held discussions with several graduate students of the University. Besides, one pre-doctorate student from the Faculty of Medicine of the University of Cuyo, at Mendoza, spent most of his summer vacation in joint research with Dr. Stapleton's group. As this arrangement proved successful, it has been proposed that staff and students from some of the institutions in the provinces be permitted to participate in the work at the CNEA laboratories during vacation periods in future. Dr. Stapleton has also recommended the introduction of visiting lectureships in the universities in the provinces and the organization of a course in radiobiology,

similar to the course in the use of radioisotopes which is offered regularly by the CNEA.

## Isotopes in Medicine

Dr. Veall's mission was concerned mainly with medical problems and lasted about six weeks during June-July 1961. His principal task was to advise Argentine doctors and research workers on improvements in isotope techniques already established in certain fields of medical investigations as well as on the introduction of these techniques in several new fields.

The Argentine National Atomic Energy Commission, in particular its Departments of Radioisotopes and Biology and Medicine, uses its own laboratories and those of 27 university and hospital research centres for work on the development and application of techniques for the use of radioactive substances. The results obtained in endocrinology, haematology and cancerology have been satisfactory, but the Argentine authorities considered it necessary to improve the techniques, and to start work on the use of radioisotopes in cardiology, gastro-enterology, gynaecology and a few other fields. It was for this purpose that the Argentine Government requested the Agency for the services of an expert in the medical and biological applications of isotopes.

Dr. Veall established a number of new clinical procedures and several Argentine doctors were trained in these applications. The clinical work and the demonstrations were carried out in the radioisotope laboratory in the Department of Semiology of the Hospital das Clinicas. The clinical tests established by the IAEA expert included the measurement of cardiac output and pulmonary blood volume, tests to

study the function of the kidney and the liver, and placentography. The practical aspects of measurements of peripheral circulation were also discussed. Besides, Dr. Veall discussed with numerous individual workers their research projects in the fields of haematology and endocrinology.

For any of these clinical investigations, a primary requirement is a supply of the appropriate labelled compound (a substance "tagged" by a radioisotope), and Dr. Veall noted that it would be a great help if these compounds could be made locally instead of being imported. Accordingly, facilities were established to make these preparations in the laboratories of the CNEA. Dr. Veall established procedures for the production of several compounds labelled with radioactive iodine (iodine-131). These included radioiodine-labelled human serum albumin (used in measurements of plasma volume and cardiac output), radioiodine-labelled hippuran (used in kidney function tests), radioiodine-labelled Rose Bengal (a dye used in liver function tests), radioiodine-labelled fats (used for fat absorption studies), and radioiodine-labelled insulin (used in studies on patients with diabetes).

In the beginning, the preparation of these compounds was carried out on a somewhat improvised basis, but as the work progressed improvements were made and future lines of development discussed. It is expected, says Dr. Veall in his report, that from now on it will be possible for the CNEA to meet the requirements of Argentine medical users for the labelled compounds mentioned above.

Dr. Veall has made several recommendations for further development of isotope applications in Argentina.