shown, that modern science has a role in everyday life and can be easily adapted for use in more primitive conditions than those in which it was developed, some steps may be said to be being made in preventing a brain drain from the lesser developed countries.

The last 20 years have shown the great technical reliance which has to be placed, and paid for, on technical advances made in sophisticated institutes in the developed quarter of the world. It is therefore desirable that the developing countries should establish their own institutes and make their own discoveries and developments, thereby relieving themselves, amongst other things, of the necessity of paying for patents.

It is possible that increasing emphasis will be placed on regulatory and inspection functions. It will certainly be agreed that what can be termed "welfare activities" as exemplified in the technical assistance programme are an essential concommitant of its other activities. No government will survive solely on the programmes of its Ministries of Defense and the Interior. Similarly, no international organization can play a useful role unless it can offer concrete evidence of welfare and assistance, particularly to its less fortunate member states.

LEARNING ABOUT LIFE PROCESSES

Knowledge of the ways by which cells of the human body counter disease or injury by forming new cells, and of the effects on them of radiation, has advanced as a result of research reported during a symposium in Monaco organized by the Agency in cooperation with the Joint Commission on Applied Radioactivity.

More than 100 scientists from 20 countries, as well as from the World Health Organization and EURATOM, attended. The subject was "The Effect of Radiation on Cellular Proliferation and Differentiation", and as a result of the discussions, lines of approach for future investigations into the ways in which new cells originate and become specialised in their function were indicated. In the haemopoietic system the body can create both red blood cells responsible for circulating oxygen and white blood cells which fight against infection and poisons; mechanisms controlling these processes are the subject of research in many countries. This research has already had considerable influence on medical treatment including transplant surgery.

The primary aim of the symposium was to clarify the present statuts of knowledge on a number of important questions relating to the nature of the basic or "stem" cell from which new cells originate; the biological system controlling both proliferation and differentiation into highly-specialised cell types; and the nature of repair mechanisms by which cells maintain the integrity of their nucleic acids (the substance in which the cell stores all its information to determine its function) following radiation or other injury. In the answer to these questions lies the ability to control unwanted cell proliferation such as occurs during the formation of tumours, or to promote regeneration when tissue is damaged by disease, birth defects, exposure to radiation, toxic chemicals, viruses, or other causes. In addition, attainment of control of such fundamental biological processes as the immune response would allow for the ready replacement of irreversibly damaged organs and tissues. The immune response is the body's defence system but it is necessary to suppress it on occasions in surgery.

Most of the final afternoon was taken up with a discussion on the trends revealed in the scientific reports. A panel under the chairmanship of H.M.Patt (USA) had as its other members J.L. Chertkov (USSR), C.J. Dean (UK), M. Feldman (Israel), J.E. Till (Canada), M. Tubiana (France) and M. Schulman (IAEA).

Till referred to different methods used in detection of the stem cells and thought it should be established whether they dealt with the same, different or overlapping stem cell types. It was important to determine what relationship the results of these experimental kinetic studies bore to blood cell formation under normal circumstances.

In connection with results observed following irradiation of tumour cells, Tubiana considered that three factors governed the tumour proliferation response to radiation, namely the number of cells in the tumour population in a growth phase, the state of maturity of the cells and the length of time they required to undergo the division process. It was also becoming apparent that substances exist, as yet unidentified, in the micro and macro environment of the cells, which markedly influence the factors for tumour growth. While the information to date is not conclusive it was facilitating the development of new experiments to test hypotheses.

Dean spoke of the exciting problems of differentiation (the ways in which cells are given different jobs to do), which seemed still to be relatively unexplored from the biochemical molecular biology aspects. It was imperative to determine whether radiation sensitivity was related entirely to the capacity of cells to repair radiation-induced damage at the molecular level and much remained to be done in the light of the leads given by recent research. As biochemical aspects were becoming clearer through studies with isolated cell systems, it became even more important to confirm and extend the information on tissues and animal systems.

Only the presence of stem cells, said Chertkov, could assure the proper functioning of the body's self-maintaining system, but so far it was not clear

whether they represented a unique type of cell line or whether there was but one stem cell for all the tissues and the organisms. What was the interrelationship between the stem cell's proliferative capacity and its ability to differentiate or become high specialised in function? How long did stem cells live? Despite the progress in research the answers were slow in coming, but the questions were now more sharply focussed. More work, more discussions, and exchange of view-points would bring the answers.

Feldman wondered why the small lymphocyte (a blood cell) was so sensitive to radiation, despite the fact that it did not proliferate, i.e. undergo mitosis, at which time a cell was normally most vulnerable to radiation injury. Perhaps the sensitivity occurred during the stage when lymphocytes synthesize antibody to neutralise antigens in the body, a period when much gene activity occurs. Perhaps impairment here leads to cell death. Experiments to find out how repairable was such injury were needed. In addition it was still not clear whether there was an inverse relationship between the formation of red blood cells and white blood cells, i.e. whether an inhibition of red blood cell formation allowed for greater growth and development of the lymphoid cell types. Clarification here would help define whether there was a common haemopoietic stem cell or at what stage the different cell lines become defined.

References were made during the discussion to the use of injections of bone marrow in treatment of radiation damage, and experiments to determine the behaviour of its cells. Patt emphasised the importance of paying full attention to the over all organization of systems as well as to the effects on specific cells.

KEEPING SEA FOOD FRESH

Research work in various countries has established that shelf-life of fresh fish can be doubled by submitting it to ionizing radiation.

A shore-based experiment to demonstrate if this method of preservation is practical under conditions such as exist in the fishing industry and trade in Iceland, will be undertaken by the Governments of Iceland and the United States with the Food and Agriculture Organization of the United Nations (FAO) and the International Atomic Energy Agency (IAEA). If successful it could benefit the fishing industry in general and make fish available to more people.

The decision to carry out the experiment was made at a meeting in Vienna attended by representatives of the two Governments and IAEA and of