reactor were subjected to high doses of neutron- and gamma-radiation, and two others, farther away, received radiation doses in excess of the permissible level. After first-aid treatment at the Institute, they were transferred to the Centre for Professional Diseases in Belgrade. The six heavily irradiated patients were flown the following day to the Curie Hospital in Paris to receive special treatment by Dr. H. Jammet. One of the patients was cured by conventional treatment, including blood transfusions; but the other five, who had had blood-forming tissues in their bone marrow destroyed by the radiation, were given treatment involving the grafting of healthy bone marrow obtained from donors matched as closely as possible with the patients by detailed blood tests. This method of treatment had been tried before on an experimental basis but had not proved particularly successful. One of the five, presumably the one who had received the highest radiation dose, died before the treatment could take effect. The four others were gradually but successfully cured. A full report of the treatment has not yet been published. The success, however, represents a landmark in medical history and will intensify research in this field.

It was recognized that if the effects produced on the irradiated persons could be related to the exact doses of radiation they had received, valuable knowledge about the biological consequences of acute and high-level radiation exposure on a quantitative basis would be obtained. Although the Institute estimated that the irradiated persons received a total average whole-body dose of 683 rems of neutron- and gamma-radiation, these were not precise enough data, and accordingly the director-general of the International Atomic Energy Agency suggested to the Yugoslav authorities that a dosimetry experiment be conducted by an international team of scientists at Vinca. A formal agreement between the Agency and the Federal Nuclear Energy Commission of Yugoslavia was concluded on February 2, 1960, under which the Agency assumed responsibility for organizing and carrying out the experiment. Yugoslavia agreed to place the reactor and the laboratory at Vinca at the disposal of the Agency and to provide personnel, instruments and services. Experts from Saclay re-designed the control equipment of the reactor and were responsible for the reactor start-up and operation. The 6·5 tons of heavy water needed as moderator were provided free of charge by the U.K. Atomic Energy Authority and arrived at Vinca at the end of March. Twelve French experts, led by J. Weill and J. Furret, arrived with their special equipment from Saclay at the beginning of April, and an American team of seven health physicists from the Oak Ridge National Laboratory, together with their highly specialized equipment, including four 'phantoms' or plastic dummies of men filled with a salt solution, reached Vinca soon afterwards. The reactor first became critical on April 20. On April 22 it was operated at a power of 1 kW. and on April 25 at 5 kW. Simultaneous measurements of the neutron- and gamma-doses were made at points where the persons in the accident in October 1958 were located. The energy distribution of the radiation at these points was investigated, particularly the ratio of the various components.

At the press conference at Vinca, the scientists who had taken part in the experiment, and Dr. Jammet, were present. In response to questions, Dr. G. S. Hurst, of the American team, stated that there was one accident in the United States (that at Oak Ridge in June 1958) in which investigations comparable to those at Vinca were possible. It was not necessary to reconstruct the exact conditions of the incident of October 1958 for the dosimetry experiment, because the techniques of dosimetry did not depend on it—in any event it would have been impossible to do so because of certain unknown factors. It was, however, important to ensure that the configuration of the reactor room was exactly the same as during the accident.

Dr. Jammet explained during the press conference that not all the Yugoslav patients had received the same medical treatment, nor had the results been identical. The Curie Hospital had no fixed programme of treatment of radiation injury. There were always some unknown factors in specific cases and the problem was to make the treatment fit the specific needs of the case. Nevertheless, the experiment at Vinca was "another stone in the edifice of our research in the medical field".

AVIATION HYGIENE AND SANITATION

GENERAL provisions in the International Sanitary Regulations which were adopted by the Fourth World Health Assembly in 1951 require health administrations *inter alia* to ensure so far as is practicable that airports in their territories have at their disposal sufficient organization and equipment for the application of the regulations and are provided with supplies of pure drinking water and effective systems for the removal and safe disposal of excrement, refuse, waste water, condemned food, and other matter dangerous to health. Certain airports (designated as sanitary airports) should also be equipped with an organized medical service and facilities to combat infection. There are no specific provisions, however, on such matters as how pure drinking-water is to be supplied or an effective waste-disposal system organized, health administrations being left to make their own arrangements (*WHO Chronicle*, 14, No. 6; June 1960).

The Assembly outlined several measures that should be taken, in conjunction with the International Civil Aviation Organization, to assist Member States to introduce high standards of hygiene and sanitation. Among them was the preparation of a guide to hygiene and sanitation in the operation of airports open to international traffic. This guide was prepared by a World Health Organization Committee on Hygiene and Sanitation in Aviation. It makes specific recommendations on water, food, and waste. All water for drinking and other personal use by crews and passengers, whether in the air or on the ground, should be free from chemical substances and micro-organisms that might cause illness in any form, and should not only be safe but also attractive,

lacking turbidity, colour and disagreeable taste or odour. Preferably, it should come from well-operated public supply systems conforming with acceptable standards. Samples should be taken at least once weekly from representative points, and the results of bacteriological analysis reported to the airport health and operating authorities and used to determine whether the airport water meets the bacteriological standard, and, if not, what corrective measures are required. The water supply should be inspected by a competent sanitary engineer at least once a year and whenever changes are made in the system that might affect the quality of the water.

If water must be drawn from a supply of inferior or unknown quality for use by crews or passengers, it should be given sufficient treatment to destroy cysts of *Entamoeba hystolytica* and the virus of infectious hepatitis; all the other disease organisms generally found in contaminated water will be destroyed by this treatment.

Food should be of good sanitary quality, placed in refrigerators as necessary, and kept scrupulously clean. All meat and fish should be thoroughly cooked before serving. In tropical countries infection with *Ascaris* is widespread, so that raw foods such as green salads and chopped raw vegetables should be avoided. All food should be carefully handled and protected from contamination by insects and other animals, soiled hands, and dirty surfaces. To prevent chemical poisoning, vessels and utensils containing such elements as cadmium and lead should be avoided, the strictest precautions observed regarding the use of poisons around food areas, and only food of the highest quality purchased. Because of the special hazards of foods like cream, milk and milk products, cracked eggs (especially duck's), 'shellfish', gravies and meat salads and dressings, preference should be given to plain, simple foods requiring the minimum of handling. Raw oysters and other shellfish should not be used unless it is certain that they are fresh, uncontaminated, and come from clean areas. Milk and milk products should be sterilized and kept in bottles; and the opened bottles should remain in refrigerators.

Special cleansing and germicidal treatment should be given to dishes and utensils before use.

The guide contains a detailed description of the handling and disposal of toilet wastes, sewage, air-sickness containers, and refuse, at airports and on the aircraft. Particular care should be taken to avoid spillage or open exposure, since this leads to fly and rat infestations. If practicable, the final disposal of garbage should be at a point remote from the airport; if not, it can be burned, buried, or ground and discharged into a sewer; open pits or dumps are unsatisfactory because of flies and rats. On aircraft, the provision of watertight receptables, easily cleanable floorings, soil-cans, tanks and wash-basins is important.

Rooms used by crews and passengers in transit at international airports should be effectively mosquito-proofed in areas where mosquitoes and flies are prevalent. Every day, any mosquitoes that may have gained entrance should be destroyed. Walls and ceilings, particularly in sleeping quarters, should be sprayed regularly with residual insecticide, in accordance with the recommendations of the WHO Expert Committee on Insecticides.

To carry out this work, airports must have adequate staff, equipment and premises. The adequacy and efficiency of ground installations are of interest and concern to many groups; to increase efficiency and co-operation, committees, such as national and local facilitation committees, should review procedures and practices and study possible improvements.

CENTENARY CELEBRATIONS OF W. M. BAYLISS AND J. S. HALDANE IN MOSCOW

A JOINT meeting of the U.S.S.R.–Great Britain Society and the Moscow Physiological Society was recently held at the Friendship House in Moscow. The meeting was devoted to the centenary of the births of W. M. Bayliss and J. S. Haldane.

The meeting was opened by Prof. V. Parin, president of the Physiological Society. Prof. K. Koshtoyants, a prominent Soviet physiologist and head of the Department of Physiology of the Moscow State University, discussed the life and research work of Prof. Bayliss. "Bayliss's name is one of the brightest in the history of world physiology", he said. Among other things, Prof. Koshtoyants said that soon after the Civil War a State Publishing House was set up in the Soviet Union. It planned the publication of a number of major works of world science, and one of the first in the list of these works was Bayliss's famous book "Principles of General Physiology". In 1927, Russian translations of two monographs by Bayliss were published. Prof. Koshtoyants went on to speak of the profound mutual interest in, and respect for, each other of Bayliss and the equally great Russian physiologist Ivan Pavlov. It so happened that Pavlov in Russia and Bayliss and Starling in Britain did parallel research on the regulation of the activity of the pancreas, but came to opposite conclusions. According to Pavlov, the gland produced its secretion as a result of nervous signals, whereas according to Bayliss the gland was made to function by an active chemical agent contained in the blood. A thorough joint investigation of the experiments showed that the Russian and the British physiologists were both right, and as a result a comprehensive modern conception of the regulation of pancreatic secretion was formed.

Prof. L. Shik then spoke of the research work done by J. S. Haldane. As a result of Haldane's researches, he said, basic conceptions were formed of the physiology of respiration. Haldane's experiments were distinguished for their remarkable outward simplicity, which was actually the result of a good deal of thought and precise preliminary calculations. Unlike many representatives of the so-called 'pure science', Haldane was interested in the problems of applied physiology, and his research on the physiology of divers and airmen provided scientific grounds for modern practical measures ensuring man's safety in the conditions of changing barometric pressure. Many of his experiments, some of which were quite