Towards the end of the report a list is given of nearly 200 papers published by members of the staff during October 1958–September 1959. In the notes which deal with staff matters, reference is made to the fact that in 1959 Prof. R. G. Baskett took up his appointment as director of the Institute, and a brief but well-deserved reference is made to the retirement of Dr. A. T. R. Mattick, who has served the Institute and the dairy industry with distinction for some forty years.

J. A. B. SMITH

NEW AMERICAN OBSERVATORIES

IN order to make astronomical research facilities available to those many universities which cannot themselves afford the necessary expensive equipment, the National Science Foundation is providing financial support for the construction of two major observatories, the National Radio Astronomy Observatory at Green Bank, and the Kitt Peak National Observatory near Tucson, Arizona.

Green Bank, in Deer Creek Valley, West Virginia, is at an elevation of 2,600 ft., ringed by mountains rising to 4,000 ft., effectively shielding the site from man-made radio noise. The climate is mild, and there are no high winds which would make operation of a large radio telescope difficult. An 85-ft. telescope was brought into operation in October 1958, and since then construction of a 140-ft. telescope, laboratories, residences and workshops has been under way. The reflecting surface of the 85-ft. telescope, made of aluminium sheet, is accurate to ¼ in. and operates down to wave-lengths as short as 3·5 cm., at which the telescope beam width is 7 min. of arc. Both telescopes are on equatorial mountings. The moving mass of the 140-ft. telescope will exceed 2,000 tons, yet it will be capable of being steered with a precision of a fraction of a minute of arc and will also have a surface accurate to ¼ in. In addition to other small telescopes there is a horn 120 ft. long; the energy which this collects can be calculated from its dimensions and it is fixed so that it can observe the radio source in Cassiopeia each day, thus providing a standard calibration source in the sky available to many radio astronomers. A variety of receivers covering the wave-length range of 3·75–75 cm. is available, and three separate receivers working on different wave-lengths can be used simultaneously on the 85-ft. telescope. Besides being displayed on the chart of a pen recorder, the receiver outputs are digitized together with telescope position and time. Extensive use of digital computer techniques is already being made in analysing and reducing the observations.

Among the first observations made at the National Radio Astronomy Observatory were a study of the radio emissions from Jupiter and a survey of the central regions of the Galaxy at a wave-length of 3·75 cm. showing remarkable detailed structure. In addition, studies are being made of planetary nebulæ and ionized hydrogen clouds, supernovæ remnants and peculiar galaxies.

Three years were devoted to testing the seeing conditions at a number of places before Kitt Peak was chosen as the site for the National Observatory in March 1958. An agreement with the Papagos Indians (who call astronomers "the People with the Long Eyes") leased 200 acres to the Observatory, and construction of an 80-in. telescope is under way. This will have a coudé focus as well as prime and cassegrain, and will be equipped for direct photography, photoelectric photometry and spectroscopy. There is also a 36-in. telescope with a cassegrain spectrograph, and two 16-in. telescopes which will be used for bright star work. The University of Arizona is also moving a 36-in. telescope to the site.

On Kitt Peak there will be an optical workshop with some of the best testing facilities in the world, together with an office and laboratory building, dining hall and dormitory, houses and a shop. But the headquarters are adjacent to the University of Arizona in Tucson, and the staff and visiting astronomers will spend most of their time in the research offices there.

It has recently been decided to build a large solar telescope on Kitt Peak. The heliostat will have an 80-in. plane mirror feeding a 60-in., 300-ft. focal length concave mirror at the bottom of a tunnel 500 ft. long. The image of the Sun, 34 in. in diameter, will be reflected on to the slit of a large vacuum spectrograph. The outside of the building will be maintained at ambient temperature to prevent disturbing convection currents.

The National Observatory and the National Radio Astronomy Observatory will be valuable additions to the research facilities of universities which could not, alone, have provided them.

V. C. REDDISH

BIOLOGICAL EFFECTS OF EXPOSURE TO INTENSE RADIATION

A UNIQUE and important experiment to determine the biological effects of acute and high-level radiation exposure has recently been completed under the auspices of the International Atomic Energy Agency at the Boris Kidrich Institute at Vinca, near Belgrade, Yugoslavia. Details of the experiment were given at a press conference held at Vinca on April 27 by the international team of scientists responsible for its organization and execution, and a brief report of the experiment and the conference is published in the *International Atomic Energy Agency Bulletin*, 2, No. 3, 3 (July 1960).

It will be recalled that on October 15, 1958, during an accident to the nuclear reactor *RB* at the Institute, six persons in the immediate vicinity of the unshielded

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,