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MONTHLY STATUS AND PROGRESS REPORTS  
FOR  
FEBRUARY 1951

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IV - BIOLOGY AND MEDICINE

Biology Branch

Human genetics. Following discussion by the Advisory Committee for Biology and Medicine, a research proposal submitted by Dr. James V. Neel of the University of Michigan has been approved and a contract is being negotiated. This is the first contract dealing with human genetics. Dr. Neel will confirm estimates of spontaneous mutation rates for certain genes which have been studied in the past and will obtain data necessary to estimate spontaneous mutation rates for several characteristics which have so far never been studied. The information on human rates of mutation are important not only to a basic understanding of human genetics, but also a better understanding and estimation of the human genetic risks associated with atomic energy.

The final report of the ad hoc Committee for evaluation of the human genetic risks associated with nuclear energy has been formally assigned and submitted to the Director of the Division of Biology and Medicine. In this report, the Committee recommends that a conservative attitude be maintained, that exposures of personnel be minimized, and that research designed to supply data for more accurate estimation of the genetic risks be continued and expanded.

Isotopic experiments in plants. The State College of Washington in isotopic experiments on the mechanics of mineral translocation in plants has in the past year been studying the conditions under which movement did or did not take place. It was determined that precipitation reactions occurred on the surfaces of roots and in the veins of leaves which were severe enough to constitute effective blocks to the utilization of certain mineral nutrients, especially iron. In the case of the leaf vein reaction, it was found to be of sufficient magnitude to retard the re-export from the leaf of calcium and iron under usual growth conditions. However, it was shown that (1) growth in an acid medium and (2) growth at low phosphorus levels caused these elements to become mobile and easily re-exported from leaves. Another, and perhaps the determining factor in rendering calcium and iron mobile, was their respective tissue concentrations. Both moved much more readily when their respective tissue concentrations were low. Phosphorus and perhaps sulfur (final results are not yet available) were freely mobile under a variety of conditions which were found to inhibit movement of calcium and iron.

Medical Branch

The winter meeting of bio-medical program directors was held in New York on February 20-21, 1951. The NYOO Health and Safety Division arranged an excellent program which included papers on a wide range of subjects with special emphasis on radiation and chemical hazards of prime importance to the Commission. The speakers were largely from the NYOO personnel and scientists representing major biology and medicine projects

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under the NYOO. Of particular current interest were reports by Mr. D. E. Lynch, Jr., of NYOO and Dr. J.B.H. Kuper of Brookhaven National Laboratory of studies of the fallout from the Nevada tests.

Beryllium Advisory Committee. The Division's Beryllium Advisory Committee met at the NYOO on February 7, 1951, and reviewed the recent data on beryllium poisoning. The recommended in-plant and neighborhood maximal allowable concentrations were not changed from those of last year, that is:

1. The in-plant atmospheric concentration of beryllium at beryllium operations should not exceed 2 micrograms per cubic meter as an average concentration throughout an 8-hour day.
2. Even though the daily average might be within the limits of recommendation 1, no personnel should be exposed to a concentration greater than 25 micrograms per cubic meter for any period of time, however short.
3. In the neighborhood of an AEC plant handling beryllium compounds, the average monthly concentration at the breathing zone level should not exceed 0.01 microgram per cubic meter.

Results from recent animal experiments at the AE project, University of Rochester, indicate that beryllium is virtually nontoxic when taken by mouth. Therefore, no special liquid waste disposal measures need be employed by beryllium. (End of UNCLASSIFIED section.)

#### Biophysics Branch

Nevada tests ~~XXXXXXXXXX~~ The Radiological Safety Group of Operation Ranger had the objectives of assuring safety for operating personnel, surrounding population, livestock, and water supplies, also of acquiring factual data to determine whether the Nevada site could be utilized as a permanent proving ground for operations of certain types. In addition, members of this group would play a large part in acquiring and disseminating first-hand facts about nuclear air-bursts as they apply to civil defense. This group was comprised of 44 people from the Los Alamos staff (mostly from the Health Division), 9 men from the Los Alamos Protective Force, 15 representatives from AEC emergency monitoring teams, and 6 men from the U. S. Army Engineer Corps.

Elaborate plans enabled these people to monitor the area itself, while 10 of their mobile teams surveyed practically every possible road going north as far as Ely, Nevada; east to Cedar Springs, Utah; south to Needles and Kingman, Arizona; and to Baker, California, and Tonapah to the southwest and northwest, respectively. Survey plans for AFOAT-1 mapped out probable areas of radioactive fallout, and other AFOAT-1 planes followed the radioactive clouds as they progressed across country. Plans were laid for evacuating populations from the surrounding areas should radiation intensities reach a dangerous level, and after each shot, air

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line schedules were altered through CAB until regular lanes were safe for travel.

Operation Ranger was carried out without a significant over-exposure to any operating personnel. In the surrounding area, almost without exception, radiation intensities did not exceed about four times background intensity, which was negligible. On Charleston Peak, approximately 45 miles southeast, intensities shortly after the fourth and fifth bursts reached values of 8 and 14 milli-roentgens per hour, but dropped in a few hours to 0.7 mr per hour. A person remaining in this area during either of these tests would not have received more than a daily permissible dose.

Monitoring operations throughout the country, carried out by members of the Hanford Works, Oak Ridge, Argonne, and Brookhaven National Laboratories, and the New York Laboratory, kept check on radioactivity in the air, and in rain and snow. At no point was any level observed which could be even slightly damaging to health.

These tests verified completely the belief that detonations of this type could be held at this site with no resulting radiological hazards anywhere in the country, provided certain basic meteorological conditions were respected. A large amount of information was obtained, or verified, which has direct application to civil defense planning. (End of [REDACTED] section.)

Shelter tests [REDACTED] In connection with the final detonation on February 6, members of the Biophysics Branch arranged an experiment to investigate the shelter potentialities of automobiles as an aid to civil defense. Five automobiles, models 1936-39, all with turret-tops and safety-glass windows, were set out in various orientations one-half mile apart at distances of one-half to two and a half miles from ground zero. As expected, the car at one-half mile was demolished and burned. The car at one mile was singed and the windows on the blast side were broken, but the car remained relatively intact. For some reason, the gasoline in the tank of the car at one and a half miles caught fire, destroying the entire inside of the car. Cars at two miles and two and a half miles were undamaged except for one cracked window. None of the cars was overturned nor shifted noticeably from its original position, nor were any tops crushed.

The tentative conclusion is that a person might take refuge in a car, particularly if he crouches under the dash or on the floor of the back seat and thereby gain fair protection from thermal and blast effects if he is beyond the one-mile zone. Within the one-mile zone the intensity of the gamma rays is likely to be lethal whether the car gives other protection or not. A car might be used for protection either on the street or in the garage at home. Likewise, an appreciable shelter would be gained by simply rolling under a car parked at the curb or in a garage. This experiment has been described to officials of the ECDA. (End of [REDACTED] section.)

Greenhouse (UNCLASSIFIED). A member of the Biophysics Branch has departed to participate in Operation Greenhouse as part of a Bureau of Standards team to test photographic response of films to radiation.

Waste disposal policy. A draft memorandum on waste disposal has been given wide distribution among AEC and contractor personnel in the field, to determine whether in their opinion the policy meets practical needs, whether it conflicts with accepted safe practices, and whether it might not serve as a basis for future administration of waste disposal operations from a health and safety viewpoint.

Civil Defense Liaison Branch

Hearing before House subcommittee on dispersal legislation. On February 8 Mr. Harry L. Bowman appeared before the Public Buildings Committee of the House which was taking testimony in a closed hearing concerning the bill which provides for the dispersal of Federal agencies located in the City of Washington. He first made a statement relative to the areas of damage to be expected for different classes of buildings from various size bombs, and then answered specific questions on shelters, materials of construction, and the hazard from flying glass.

Briefing session for Federal Civil Defense Administration personnel. A briefing session was arranged on February 13 to acquaint FCDA top staff members with the results of the Nevada tests bearing on civil defense. Governor Caldwell attended, accompanied by Dr. Norvin C. Kiefer and John D. Young. Chairman Dean, Dr. Smyth, Mr. Boyer, and various members of the staff were present. Representatives of Biology and Medicine and DMA outlined salient information and previewed the future test program.

Review of Kansas City shelter plans. At the request of the FCDA detailed plans for a multi-purpose Kansas City air raid shelter (and underground garage) were evaluated with respect to the protection that would be afforded against radiation hazard in event of atomic bombing. Evaluation of the plans for protection against blast was requested by FCDA of the Corps of Engineers.

Conference of State Civil Defense Directors. A member of the Branch attended the February 12 Conference of State Civil Defense Directors called by FCD Administrator Caldwell. Mr. E. R. Fleury, Disaster Planning Coordinator, was also present.

Loans of instruments and radiation sources. During the month arrangements were made for loan of radiation detection instruments to Washington State College and of radiation sources to the State University of Iowa, through the appropriate Operations Offices, for civil defense training purposes.

Technical information furnished FCDA. Certain correspondence of instrumentation and health physics specialists within the AEC regarding

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civil defense radiological defense problems and the FCDA's monitoring instrument specifications were transmitted to Dr. Kiefer, Director, Health Services and Special Weapons Defense Division, for use in his program.

Radiation Instruments Branch

AEC-sponsored research and development. A test quantity of UCLA colorimetric dosimeters is being furnished to the Chemical Corps, Technical Command, for evaluation pursuant to the possibility of the Chemical Corps continuing the support of this development.

Approximately 300 of the chemical dosimeters and three readers developed at the Rochester Atomic Energy Project have been received and shipped to project Greenhouse.

One prototype of the ORNL-designed civil defense ion chamber survey meter has been completed by the Raytheon Manufacturing Company and examined by the designer, Mr. P. R. Bell. The instrument calibration for radium gammas is continuous between .005 roentgens and 500 roentgens. A window is included for the admission of alpha particles to the ion chamber. The prototype meter will be operationally tested with other similar instruments at project Greenhouse.

The U. S. Geological Survey has requested that a commercial source be established for a scintillation survey meter, such as the one developed by the Chemical Division at ORNL. The Survey has expressed a desire to secure an initial quantity of 10 instruments. AEC sites will be solicited to determine quantities needed prior to the initiation of a contract.

The Health Physics Division at ORNL has expressed a desire to have the Radiation Instruments Branch sponsor a production-engineering contract to produce commercially a neutron dosage rate meter and an alpha survey meter developed by that group. The laboratory's proposal is being forwarded to the Branch by Oak Ridge Operations.

Research Projects Approved During February, 1951

The following 17 proposals totaling \$205,551 were approved for negotiation or renewal during February, 1951.

Biology

Brown University - \$19,958 (1 yr.) - Dr. J. Walter Wilson - "The role of the intestinal flora in radiation injury"

University of Illinois - \$8,395 (1 yr.) - Dr. I. C. Gunsalus - "Metabolic pathways in microorganisms"

Johns Hopkins University Medical School - \$7,452 (1 yr.) - Dr.

Curt P. Richter - "Part played by the adrenals in the ability of rats to withstand radiation effects"

Long Island Biological Association - \$33,642 (1 yr. renewal) - Dr. Bruce Wallace - "Adaptive value of experimental populations exposed to radiations"

University of Michigan - \$21,060 (1 yr.) - Dr. James V. Neel - "The estimation of the rate of mutation on certain human genes"

University of Nebraska - \$13,878 (1 yr.) - Drs. E. F. Frolik and Rosalind Morris - "The genetic effects of thermal neutron irradiation of crop seeds"

Rutgers University - \$4,352 (1 yr.) - Dr. James E. Gunckel - "Histological and physiological effects of irradiation on tradescantia paludosa"

University of Wisconsin - \$1,080 (1 yr.) - Dr. Joshua Lederberg - "Cytogenic effects of radiations on bacteria"

University of Wisconsin - \$8,964 (1 yr. renewal) - Drs. A. J. Riker and J. E. Kuntz - "The use of radioactive isotopes to ascertain the role of root grafting in the translocation of water, nutrients, and disease-producing organisms among forest trees"

Medicine

Columbia University - College of Physicians & Surgeons - \$15,000 (1 yr.) - Drs. Perry B. Hudson and John M. Reiner - "The turnover of specific proteins, protein fractions and nucleic acids in normal and malignant human testis and kidneys"

George Washington University, Washington, D. C. - \$12,312 (1 yr.) - Dr. Paul K. Smith - "Studies of the effects of radiation on the biosynthesis and degradation of nucleoproteins and its modification by various agents"

Harvard University - Beth Israel Hospital - \$14,300 (1 yr. renewal) - Dr. Herman L. Blumgart - "Long-term radiation effects of  $I^{131}$  in man"

Johns Hopkins University - Wilmer Ophthalmological Institute - \$3,888 (1 yr.) - Dr. John S. Friedenwald - "Enzymatic histochemistry of the ocular lens"

Northwestern University - \$3,240 (1 yr.) - Dr. Loyal Davis - "Further development and utilization of radioactive dyes in the diagnosis and localization of brain tumors"

University of Pittsburgh - \$26,774 (1 yr.) - Dr. Francis S. Cheever - "The effect of radiation on the virus-host cell relationship"



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Biophysics

University of Kansas - \$3,425 - Dr. Frank E. Hoecker - "Biological effects of ionizing radiations" (Supplement to present contract making total of \$34,425)

University of Michigan - \$7,830 (1 yr. renewal) - Drs. H. T. Gomberg and F. J. Hodges - "Autoradiography" (End of UNCLASSIFIED section.)

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