

286

PROGRESS REPORT

DIVISION OF BIOLOGY AND MEDICINE

OCTOBER, 1950

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Research Projects Approved During October, 1950

Biology

Louisiana State University - \$3,400
Investigator: Dr. H. E. Wheeler
Title: "Investigations of the Physiology, Genetics, and Host-Parasite Relationships of Plant Pathogenic Fungi by Use of Radio-isotopes for Tagging Fungus Mycelium"

R

University of North Carolina (Contract AT(40-1)-299-1) - \$10,200
Investigator: Dr. D. P. Costello
Title: "Radiation Effects on Salamander Larvae" (Renewal - 19 mos)

University of Wisconsin (Contract No. AT(11-1)-64-1) Renewal - \$6,750
Investigators: Drs. H. H. Burris, M.J. Johnson and F. W. Wilson
Title: "Metabolism of Organic Acids Higher Plants and Microorganisms"

University of Wisconsin (Contract No. AT(11-1)-64-11) Renewal - \$5,000
Investigator: Dr. R. H. Burris and Dr. F. W. Wilson
Title: "Studies of Biological Nitrogen Fixation with Isotopic Tracers"

Medical

New York University - Bellevue Medical Center - \$6,267
Investigator: Dr. William D. Tillett
Title: "The Influence of Ionizing Radiation on Enzyme Systems"

University of Chicago - \$6,815
Investigator: Dr. Peter P. H. DeBryna
Title: "Radiosensitivity of the Lymphocyte"

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Western Reserve University - \$8,100
Investigator: Dr. L. C. Kravits
Title: "The Effect of Incorporated Radioactivity on the Biological Activity of Bacteriophage"

Western Reserve University - Renewal - \$34,608
Investigator: Dr. Harland G. Wood
Title: "Intermediary Metabolism of Carbohydrates by Bacteria"

University of Virginia - \$21,600 - Renewal
Investigator: Dr. Alfred Chanutin
Title: "Effects of Ionizing Irradiation on Mammals"

University of Washington - Seattle, Washington - \$12,528
Investigator: Dr. Clement A. Finch
Title: "Studies Related to Blood Preservation"

16-66585-1 GPO

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW	DETERMINATION (CIRCLE NUMBER(S))
	1. CLASSIFICATION RETAINED 2. CLASSIFICATION CHANGED TO: 3. CONTAINS NO DOE CLASSIFIED INFO 4. COORDINATE WITH: 5. CLASSIFICATION CANCELLED 6. CLASSIFIED INFO BRACKETED 7. OTHER (SPECIFY):
SINGLE REVIEW AUTHORIZED BY:	REVIEWER (ADD):
AT S. V. SCARLETT 11/2/50	ML K. E. BRY
NAME:	DATE:
	11/7/50

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SURNAME	<i>[Signature]</i>
DATE	11-21-50

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Medical (Cont'd)

University of Washington School of Medicine -- \$9,288
Investigator: Dr. Robert D. Ray
Title: "Mobilization of Radioactive Emitters from Bone"

Duke University School of Medicine - \$12,042
Investigator: Dr. M. W. Rundles
Title: "Metabolism of Human Bone Marrow"

Biology

Radiation Studies of Plant Pathogens

The unicellular condition in which bacteria, fungi, and algae frequently occur leaves the genetic constituents of the cell relatively exposed to the effects of radiations and chemical mutagens which have only to penetrate the cell's cytoplasm, membranes, and walls. As each living cell is an individual potentially capable of producing an entire population identical to itself, every induced mutant may be perpetuated if it has necessary growth factors. Each cell division creates a new generation, and increases the possibility of the accumulation of many mutant characters. At the University of Minnesota the effects of radioactive substances on plant pathogens and other microorganisms are being more fully investigated in an attempt to determine the biological significance and usefulness of changes induced by radioactive materials.

One of the initial phases of this study was to make a general survey of representative species of fungi to determine the effectiveness of uranium. The organisms were selected on the basis of genetic stability or instability, nuclear conditions, and suitability from either scientific or economic viewpoints, and were grown on solid culture media containing uranyl nitrate. Approximately fifteen species of those tested produced sector variants with this technique.

Mammalian Genetics

Important results in the mammalian genetics program at the ORNL includes confirmation of the rather high frequency of partial sterility, believed to be due to induced chromosomal changes in mice after radiation. While data are still not extensive enough to permit broad conclusions, it appears that the frequency of partial sterility is rather higher than might be expected for a given dosage based on chromosome interchange frequency in plants and drosophila. Perhaps the greater number of chromosomes per cell may be partially responsible (8 for Drosophila, 40 for mice, 48 for man).

Studies of the embryological effects of radiation of developing embryos are being continued. Recent evidence indicates that doses of 25-50r, which are in the human fluoroscopy range, may have effects upon embryological development of certain characteristics.

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Results of a pilot experiment to determine feasibility of the proposed large scale study of radiation-induced mutation of specific genes became available during the past quarter. Results, which are encouraging from viewpoint of success of the experiment but disturbing from the viewpoint of the genetic consequences in mammalian species of utilization of atomic energy on a large scale, indicate that the sensitivity of genes in mice at least is as high as in *Drosophila* and possibly 50 to 100 times higher.

Medicine

Atomic Bomb Casualty Commission - Japan

The National Research Council has informed this Division that all clinical research activity at Kure, Japan, had been discontinued as of August 31, 1950. Kure had been used as a "control city" in the study of the effects of atomic bombs on survivors at Hiroshima and Nagasaki. "Intrinsic controls" will be used in the future.

Conference of Industrial Health Personnel

Plans are being made for a "Conference of Industrial Health Personnel of the U. S. Atomic Energy Commission (Restricted)" on Friday, April 27, 1951, during the Industrial Health Conference at Atlantic City.

Survey of Physiologists Connected with the AEC

In order to be able to furnish the HSRH with pertinent information about physiologists connected with the AEC program questionnaires have been distributed to major contractors and to Operations Offices.

Therapy of Radiation Injury

The experimental results obtained during the past year toward the treatment and amelioration of the illness resulting from exposure to near lethal doses of radiation have been sufficiently promising to warrant an intensification of efforts directed toward refining these therapeutic methods to a point where they might be useful in treating human casualties. To this end a large scale therapy program on dogs has been initiated at the University of Rochester Atomic Energy Project. The objectives of the program is to provide within a one year period, definitive recommendations for the treatment of human atomic casualties.

Biophysicists

A meeting was held at the University of Utah Project to inspect the site, and to discuss with interested persons from the University, Los Alamos and New York Operations Office, the details of the experiment which is designed to obtain more substantial data on the biological effects of chronic exposures of animals to plutonium, radium and mesothorium. The project will be under the direction of Dr. John Z. Bowers, formerly Deputy Director of the Division of Biology and Medicine, and now Dean of the School of Medicine of the University of Utah. With the

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cooperation of various members of the University faculty, Dr. Rowers will conduct one of the most important research projects supported by this Division, the results of which will be most important in the determination of sound permissible doses of a number of radioactive isotopes.

Members of the Biophysics staff visited the Reactor Test Site, and conferred with the Manager of the Idaho Operations Office and members of his staff. Because of the unusual situation existing at the Site, where the various units will be operated by four or more different contractors, the present plans call for a central ABC group to conduct most of the radiation protection (health physics) operations. Plans and personnel for this group were discussed, and will continue to require the attention of the Branch for some time to come.

During the past summer, members of the Faculty of Idaho State College at Pocatello cooperated with personnel from Hanford and from the Idaho Operations Office, under the general direction of Mr. Deal of the Biophysics Branch, in performing a survey of background radiation in the soil, air, water, vegetation and animal population of the territory around the Reactor Test Site. Members of the Branch visited the College to discuss the results, and to consider possibilities of the continued services of the College staff in re-surveying. From time to time, the general level of radiation in and about the site. The availability of such surveys by a disinterested group should merit materially in allaying any fears that Idaho citizens and officials might be inclined to develop, regarding the safety of the reactor operations.

Discussions were held with members of the Hanford Operations Office and of the contractor's staff regarding the program and budget presentations of the Health Instruments Division, and the building program. Present inadequate quarters have inhibited acquisition of a full technical staff, but it is believed that completion of two buildings during the next year will permit the research and development program to reach the contemplated level. The discussions aided greatly the clarification of the mutual problems of the contractors, which should result in smoother operations and better representation of Hanford interests.

Members of the Branch cooperated with representatives of the Navy and of Westinghouse on radiation protection problems for the Submarine Testing Reactor, and outlined the plan by which the ABC would provide central facilities for laundry, film badge and pocket chamber services and site survey. Westinghouse would provide their own reactor protection. Details of automatic monitoring systems, supplemented with manual monitoring, were discussed. The Branch provided the engineers with tentative permissible concentrations for radioactive isotopes most likely to be found as contaminants from such a reactor system.

Civil Defense Liaison Branch

Loan of Radiation Detection Instruments

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The Atomic Energy Commission has made arrangements to loan instruments and/or radiation sources, at the request and upon the approval of the National Security Resources Board, to states or localities for second-level radiological monitoring training purposes, where such instruments can be spared from regular AEC activities. To date loans to Ohio, South Dakota, and Oregon have been consummated through the appropriate field offices.

Review of NSRB Documents

NSRB Document 128, "Survival Under Atomic Attack" upon request by the Acting Director, Civil Defense Office, National Security Resources Board, was given thorough staff review prior to publication on October 28, 1950 and several suggestions were made for revision, most of which were accepted.

Similarly, NSRB Document 130, "Fire Aspects of Bombing Attacks" received AEC staff review and comments. This report is scheduled for early release.

Safety Survey of West Building Offices

The Acting Chief, Civil Defense Liaison Branch has recently examined the offices of the Commissioners, General Manager and Division Directors located in the main building to assess the vulnerability of each to blast damage in event of a surprise bombing attack. Recommendations have been made on the basis of this examination for internal rearrangement of several of the offices to afford maximum protection to the occupants.

American Council on Education Conference

At the request of the American Council on Education a member of the Civil Defense Liaison Branch attended their Conference on Higher Education in the National Service held in Washington on October 6, 1950, for the purpose of serving as a consultant, along with representatives of other interested Federal agencies, to the panel on Civil Defense.

Joint Institute of Radio Engineers and American Institute of Electrical Engineers Conference

The Acting Chief, Civil Defense Liaison Branch participated in the panel discussions on atomic bomb effects and protective measures of the Joint IRE/AIEE conference held in New York on October 24, 1950.

Radiation Instruments Branch

The circulation of RA-DET, starting its fourth year of publication with the November issue, has climbed to 621 copies which are distributed primarily to AEC installations and its research contractors. However, a large distribution is made to the Department of Defense, USGS, the U. S. Public Health Service, and other Government agencies having related interests requiring radiation instrumentation.

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Plans are under way for the production engineering development of an Oak Ridge National Laboratory designed fast neutron survey meter of the proton recoil type. Because of the extensive interest in this instrument by Commission installations requiring reliable fast neutron survey equipment, this project will be given high priority.

Also under the consideration for production development is a gamma scintillation counter, designed by ORNL, which not only is one of the most sensitive instruments developed to date, but is extremely stable and reliable. The possibility of using this instrument to detect smuggled nuclear weapons will be investigated.

Plans for the Radiation Instruments Branch participation in Greenhouse Project 5.1 are proceeding on schedule.

Visits

Mr. John A. Derry made a survey of the Donner Laboratory at the University of California in Berkeley for the purpose of discussing with Drs. Hardin Jones and Joseph Hamilton fiscal matters as they relate to biological and medical problems. He also visited Dr. Robert Stone to discuss problems arising at the Radiological Laboratory which is now under construction at the University of California Medical School in San Francisco. Mr. Derry conferred with the Medical Director of the Standard Oil Company of California concerning the health aspects of the MTA project and offered the assistance of the Division of Biology and Medicine in any of their medical problems.

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