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Carroll L. Wilson, General Manager

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July 20, 1950

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Shields Warren, M.D., Director,
Division of Biology and Medicine
PROGRESS REPORT - DIVISION OF BIOLOGY AND MEDICINE,
MONTH OF JUNE 1950.

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Transmitted herewith is the Progress Report for the month of June 1950
for the Division of Biology and Medicine.

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PROGRESS REPORT - DIVISION OF BIOLOGY AND MEDICINE - MONTH OF JUNE, 1950

RESEARCH PROJECTS APPROVED OR RENEWED DURING JUNE 1950:

The following numbers of research projects were approved for negotiation or renewal during June for direct AEC administration:

	<u>No. of Projects</u>	<u>Amount</u>
Biology	3	\$ 63,780
Medicine	6	138,436
Biophysics	3	158,700
	<u>12</u>	<u>\$360,916</u>

In addition, five proposals were declined. A list of the projects covered in the above summation is available in the Division of Biology and Medicine.

FIFTH INTERNATIONAL CANCER CONGRESS & SIXTH INTERNATIONAL CONGRESS OF RADIOLOGY.

Through the Technical Cooperation Program, arrangements have been made for the following persons to visit the Atomic Energy establishment at Harwell, England while they are attending the above meetings in Paris and London as accredited visitors of the AEC: Dr. Shields Warren, Dr. Robley Evans, Dr. G. Failla, Dr. J. G. Hamilton, Dr. Alexander Hollaender, Mr. L. D. Marinelli, Dr. Leslie F. Nims, Dr. H. M. Parker, Dr. Robert S. Stone and Mr. Lauriston S. Taylor.

The discussions held at Harwell will be unclassified. Arrangements are also being made for the group to be conducted on a classified guided tour of the restricted areas to the extent that the United Kingdom authorities determine is appropriate.

A further session of the "Permissible Dose Conference" which was held at Chalk River, Ontario, on September 29-30, 1949, will be held while the group is in England. Most of the original personnel will be present for these discussions.

BIOLOGY BRANCH

Experimental Population Genetics

In an effort to determine the genetic change occurring following irradiation, experimental populations of drosophila are being studied at the Long Island Biological Laboratories. Analyses over a period of sixteen generations show that lethal chromosomes have accumulated in the untreated

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population at an essentially linear rate of 0.4 - 0.5% per generation, a rate consistent with known mutation rates. In the populations treated with a large dose of x-rays (7000r for males, 1000r for females), the lethal chromosomes dropped from an original frequency of 18% to 10% in four generations and subsequently have increased in frequency at a rate comparable to that of the control. The initial decrease is that expected from the elimination of translocations which were coincident with recessive lethals. It seems, therefore, that induced recessive lethals which are not associated with translocations have remained in the population and are included in the concealed variability of the population, whereas those induced lethals which were associated with translocations were eliminated rapidly as a result of the concomitant reduction in fertility associated with the translocations.

To determine the frequency of allelism of recessive lethals, a primary source of elimination of these lethals from any population, series of cross tests were made between lethals (induced by gamma x-rays) of independent origin. The number of loci calculated from our results is 400 with possible values ranging from 234 to 718 (99% confidence interval). This number does not differ significantly from that determined by Ives from studying lethals of spontaneous origin. The magnitude of this number makes it highly improbable that any appreciable elimination of recessive lethals has occurred through homozygosity.

Analyses of the viabilities of those flies homozygous for non-lethal, non-semi-lethal chromosomes (i.e., the bulk of the tested chromosomes which seem to be "normal" at first glance) reveal that their average viability is relatively constant but preliminary analyses indicate an increase in the variance of their distribution. This implies that a counteraction of mutation of deleterious genes (sub-vitals) and the selection for advantageous genes (gene combinations) have, to date, maintained the constant average viability. Since, however, the detailed analyses of this problem have just begun, it is best that this conclusion be taken with some reserve. It seems highly probable that this mechanism is operative in the control population but it is too early to discuss the experimental populations.

Gamma Radiation.

A conference was held at Oak Ridge June 6 to consider a project originating with the Toxicity Laboratory of the University of Chicago on the effects of gamma radiation on mammals. The project sponsored jointly by the Division of Biology and Medicine and the Division of Military Application was originally planned to be carried out at Dugway. Since burros are adaptable to the environment at Dugway and are approximately the size of man, they will be used as the experimental animal. The animals will be irradiated with tantalum. Studies will be made on the effect of radiation on sperm physiology, work capacity and blood constituents.

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The project will be carried out under contract with the University of Tennessee with some personnel from the Toxicity Laboratory being transferred to Oak Ridge with appointments on the University of Tennessee staff.

MEDICAL BRANCH

Plutonium Toxicity Project - University of Utah

During the past year it has become increasingly important to Commission operations in plutonium processing that the actual tolerance dose or permissible burden of plutonium in human beings be determined with a higher degree of accuracy. Previous determinations of permissible burden have been based upon experiments with rats, mice and other small animals. The validity of extrapolating this data to cover the conditions of human being exposed to plutonium is open to considerable question. It was determined that the dog was an animal of choice for determining this tolerance. Attempts to find existing facilities within Commission installations and in other Federal laboratories which would permit a long-term animal experiment on the chronic toxicity of plutonium involving the use of 200 to 300 dogs was without result. The University of Utah Medical School and its dean designate, Dr. John Z. Bowers, expressed an interest in assisting the Commission in the solution of this problem. Accordingly, arrangements were made with the University of Utah to construct animal facility permitting studies with as many as 250 dogs, and a ten-year program of research on the toxicity of plutonium, radium and other radioactive emitters was initiated. It is expected that this program will be under way by November 1950 and that results of significant value to the Commission in questions of plant design and operation will accrue within two to three years.

Medical Information Exchange.

At the request of the member agencies of the Interdepartmental Committee for Research and Development, the Atomic Energy Commission was asked to serve as the contracting agency for the group and to establish with the National Research Council an arrangement for the support of a Medical Information Exchange. The exchange will maintain and distribute information on the degree of support afforded individual investigators, institutions, specific programs and areas of research. The satisfactory operation of this exchange will greatly reduce the possibility of duplication of effort by the various federal and private agencies in the support of medical and biological research and should prevent over-emphasis and under-emphasis on various fields of medical research.

BIOPHYSICS BRANCH.

A representative of the Biophysics Branch returned from Idaho after completing arrangements for a study of the natural radioactive background of

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the area in and around the Reactor Test Station. Arrangements were for collection of vegetation, animal, soil and water samples. This will include measurements of the natural radioactive elements in the water and vegetation as well as a determination of the radioactivity of air.

A contract was made for the Idaho State College at Pocatello to make an ecological survey of the Reactor Test Station site and to collect samples of the vegetation and animals.

Arrangements were made with Hanford for the radioactivity analysis of the samples of vegetation, animals and water and the determination of the radioactive background of the air is also being done by Hanford. Four automatically recording stations were installed in the vicinity of the Reactor Test Station.

The Biophysics Branch was represented in a conference on June 20 and 21 at Richland, Washington, in which the scope of a proposed U. S. Public Health Service of the Columbia River was discussed with representatives of this Service and preliminary plans made for usefully integrating it with the Health Instruments environmental studies already under way or planned as a part of the Hanford program.

A symposium on the "Basic Aspects of Radiation Effects on Living Systems" was held at Oberlin College, Oberlin, Ohio, June 14-18. Dr. Shields Warren discussed "The Acute Effects of Ionizing Radiation in Man". The symposium, attended by approximately 300 people, including three from the Division of Biology and Medicine and a great many from AEC installations, was held under the auspices of the National Research Council with joint support by this Division and the Office of Naval Research.

CIVIL DEFENSE LIAISON BRANCH

Radiation Emergency Control Program.

1. With 18 monitoring teams in the preliminary field training period, considerable effort has been expended in gathering from various sources up to date maps of each of the 197 cities of 50,000 population and over (1940 census).

This process of collection is rapidly nearing completion with a present file of 15 copies each, of all but a scattered few cities in the Chicago, Oak Ridge and Janta Fe areas. The New York and Hanford areas are completed. As soon as some 16 remaining sets of maps are received and prepared, shipment can be made to each Operations Office.

2. A Standard Operating Procedure for the Washington team was prepared, closely paralleling the Oak Ridge procedure.

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3. The Operations Offices which have not submitted operational plans for their areas were requested to do so. After receipt and study of all plans a meeting of representatives responsible in each area will be held for the coordination of the program on a nationwide basis.

Interim Civil Defense Plans for Key Areas

The formal Washington, D. C. civil defense exercise formulated by the National Security Resources Board and the District Government jointly took place the week of June 5. In a week-long series of meetings, a critique was developed of the original plans written by the various D. C. departments and their adaptation to the hypothetical atomic attack problem.

Representatives of the Civil Defense Liaison and Radiation Instruments Branches and of the Public and Technical Information Division were present at several of the meetings.

At the request of NSRB for active participation in this program as it continues, arrangements were made for Mr. Harry L. Bowman, Civil Defense Liaison Branch and Dr. L. R. Donaldson, Applied Fisheries Laboratory, University of Washington, to attend the Seattle exercise starting the week of July 10.

Interdepartmental Committee on Radiological Monitoring.

On June 21 an invitation was addressed to the General Manager to appoint five AEC representatives to the NSRB Interdepartmental Committee on Radiological Monitoring. Formal establishment of this Committee is an outgrowth of a two-day informal meeting called by the Civilian Mobilization Office in April, attended by persons with competence to advise on a nationwide radiological monitoring program for civil defense. Several members of the Division of Biology and Medicine attended this preliminary meeting together with persons from Department of Defense, Public Health Service, National Institute of Health and General Services Administration.

The Committee will consider matters such as the numbers and types of persons to receive second and third echelon training, organization of monitoring services, instruments, their standardization and calibration, maintenance and repair and permissible radiation doses.

Disaster Observation.

Mr. Bowman visited the site of the South Amboy explosion to observe resultant physical damage. It was learned that this disaster had occasioned no panic, little hysteria and the men of the communities (South Amboy and Perth Amboy) reported to their city halls for duty. This is borne out by a report on the psychological aspects of the disaster prepared by the Operations Research Office of the Army. These communities are not average, however, in that they have had previous disaster experience and are accustomed to having explosives loaded at their docks. South Amboy had a disaster committee

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and Perth Amboy a well-studied disaster plan.

RADIATION INSTRUMENTS BRANCH.

Contract negotiations were consummated by the Washington Headquarters Procurement Office with four companies for civilian radiological defense type monitoring instruments. Five different types of instruments are being procured at a total cost of \$20,160. Delivery of twenty models of each type is scheduled prior to January 1, 1951.

\$41,000 has been allotted to the Oak Ridge Operations Office for use by the Oak Ridge National Laboratory in financing a contract with the Raytheon Manufacturing Company for production engineering of a pocket-sized survey meter. This contract will be divided into two separate phases - the improvement of presently available electrometer tubes and the design of an instrument proper. This instrument will be sensitive to alpha, beta and gamma radiation and will be calibrated from 1/100 to 100 roentgens per hour with an indication accuracy in the order of plus or minus 15 to 30 per cent.

Development at the other Commission sites is continuing. Contracts are being negotiated by both Brookhaven and New York for instrument component development. \$56,000 was allotted to the Naval Radiological Defense Laboratory for a feasibility investigation of three additional types of radiological monitors.

A conference on reactor instrumentation was held under the joint sponsorship of the Radiation Instruments Branch and the Atomic Power Division of the Westinghouse Electric Corporation at Pittsburgh on June 5 and 6. The conference, being the first scheduled on this type of instrumentation, was very successful in disseminating information and resolving various reactor instrumentation problems.

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