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MEETING OF
ADVISORY COMMITTEE FOR BIOLOGY AND MEDICINE

Held at the

OAK RIDGE NATIONAL LABORATORIES

OAK RIDGE, TENNESSEE

May 5, 6 and 7, 1955

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ADVISORY COMMITTEE FOR BIOLOGY AND MEDICINE

May 5, 6 and 7, 1955

The fifty-first meeting of the Advisory Committee for Biology and Medicine was held at the Oak Ridge Operations Office, in Oak Ridge, Tennessee on Thursday, Friday and Saturday, May 5, 6 and 7, 1955, with the following persons in attendance:

ATTENDANCE:

Members of ACBM	Dr. Giacchino Failla, Chairman Dr. Shields Warren, Vice-Chairman Dr. Charles H. Burnett Dr. Simeon T. Cantril Dr. Edward A. Doisy Dr. Curt Stern
Staff of Div. of Biology and Medicine	Dr. John C. Bugher, Director Dr. Charles L. Dunham Dr. Paul B. Pearson Dr. Nathan S. Hall Mr. Herbert A. Stanwood, Jr. Miss Rosemary Elmo Mrs. Frances R. Montgomery, Secretary
Consultant	Dr. Elvin C. Stakman
Staff of OROC	Dr. N. H. Woodruff Dr. C. S. Shoup Dr. H. M. Roth et al

THURSDAY, MAY 5, 1955, 1:30 P.M.

The Committee members (with the exception of Dr. Stern who arrived in the evening) and AEC representatives met at the University of Tennessee-Atomic Energy Commission laboratory building on Thursday, May 5, 1955, at 1:30 P.M. Mr. Sapirie, Manager of the Oak Ridge Operations Office, presented a description of the production, construction, engineering

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and research and development programs which are the responsibilities of Oak Ridge Operations. At the conclusion of the Manager's review and welcoming remarks, the meeting was opened for the UT-AEC staff to present their program.

University of Tennessee
Atomic Energy Commission
Program

Dr. H. H. McLeod, Dean of the College of Agriculture reviewed the program and indicated

that its interests are closely allied with programs of both the Commission and the University. Mr. John A. Ewing, Project Leader stated that the functions of the UT-AEC Program are to accomplish research objectives within Commission and University interests, to use the external radiation field most effectively and to encourage cooperative institutions and experiment stations, and to provide objectives for training graduate students. The Committee discussed the extensive experimentation which is being carried out with both laboratory and domestic animals in an effort to evaluate possible effects of dissemination of radioactive materials in animals, the effects of exposure to external radiation and to exploit the beneficial use of radioisotopes in agriculture.

The College of Agriculture people were called on to describe some of the work the University wants to do on its own on beef cattle breeding in the control herd at UT-AEC project.

At the conclusion of the program, Dr. McLeod asked for comments. The Committee stated that the people presenting the program appear enthusiastic, that there is general approval for their entering into a

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certain amount of plant work using the exposure field, and that full advantage might be taken of cooperation with other southern institutions. Dr. Warren stated that UT-AEC program represents the only large animal facility we have, and that the radiation field is unique and the advantages of the field should not be overlooked. A criticism was voiced regarding the size of the UT-AEC technical advisory committee in that too large a committee with too much emphasis might tend to stifle investigation.

Dr. McLeod asked the opinion of the Committee regarding the designation of Dr. Patrick the present acting Laboratory Director, as permanent Director. It was called to the Dean's attention that the majority of those present had never met Dr. Patrick before this meeting nor seen the current developments in the program, and that the responsibility for making this decision rested with the University. It was pointed out however, that a decision regarding a permanent Director should be based on experience of the man and the local and regional leadership he could demonstrate and that a Director for the UT-AEC Program should be of such stature that he could meet other leading scientists and Oak Ridge Operations Laboratory Directors on an equal basis.

FRIDAY, MAY 6, 1955

Oak Ridge Institute
of Nuclear Studies

Dr. Marshall Brucer, Chairman, Medical Division,

Oak Ridge Institute of Nuclear Studies convened the meeting at 9:00 A.M. He welcomed the Committee and summarized the program of the Division. Members of his staff outlined their respective programs.

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Dr. Gould A. Andrews reported on recent developments in a long range program on clinical studies with radioactive colloids.

-Dr. Granvil C. Kyker gave a very interesting report on studies with rare earth. He explained the procedure wherein representative elements of the lanthanide group were used in animals.

Dr. Ralph Kniseley of the Thyroid Pathology Division described the studies being conducted on excretion patterns following iodine administration, the blood levels of Iodine-131 and the histological picture in thyroid recovery.

Dr. C. L. Comar, discussed low-level counting studies. He said that techniques and facilities are being developed for relatively low-level beta and gamma counting. A brief description was given of present work on Iodine-131 determinations in cattle and human thyroids and on milk and bone.

Dr. Brucer described the Thyroid Uptake Calibration Program. Studies were presented of the spectrum of "mock-iodine"- the plans for evaluation of the calibrations, and the proposed presentation for the Geneva Conference.

Dr. Vincent Collins from Baylor University in Houston, Texas, a member of the Teletherapy Evaluation Board presented the main aspects of the TEB program. He brought out that ORINS Medical Division has pioneered cooperative development and evaluation with medical centers throughout the nation of teletherapy equipment and is currently testing a kilocurie rotating cesium unit in Oak Ridge. A question was raised as to the TEB evaluation of survival, and it was stated that consideration of this would be a part of the lung carcinoma studies and some

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of the bone work.

At the conclusion of the ORINS Medical Division review, the Committee inspected the cesium teletherapy machine which was being installed.

FRIDAY, MAY 6, 1955, 1:30 P.M.

Health Physics Division
Dr. K. Z. Morgan

Dr. K. Z. Morgan, Director of the Health
Physics Division opened the discussion of

this program. The main areas of research in Health Physics were presented with a resume' of efforts toward securing additional data relating to calculations for the maximal permissible concentration for various radio-elements, a main problem being the interpretation of single dose data in terms of chronic exposure.

Dr. Stanley Auerbach spoke of Ecological Considerations of Soil Organisms; Dr. Conrad Straub on Soil Absorption of Specific Isotopes and Dr. S. H. Hurst on Dosimetry.

Dr. Failla remarked upon the unique nature of the work in progress, giving due credit to Dr. Morgan's group for its initiation.

Dr. Elda Anderson reported on the Radiological Physics Fellowships, noting that of the 101 who have completed the program, 62% are in Health Physics work, and 20% are in graduate schools.

Biology Division
Dr. A. Hollaender

Dr. Hollaender stated that the Oak Ridge National
Laboratory Biological Research Program consists

of a group of long-range basic activities in quantitative biology concerned with the effects of all kinds of radiations on a variety of living material both plant and animal. He brought out that the experimental studies are demonstrating how radiations change inheritance, alter biological processes, and modify the normal biochemistry of cells and tissues. The fundamental data being provided by this program

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constitute major contributions to the world's knowledge of the biological hazards from radiation, and are leading towards development of possible means for the alleviation or prevention of radiation effects. Studies are under way toward enhancement of recovery of the mammal from radiation damage, and a new program of chemical protection against radiation injury is beginning in fiscal year, 1956.

The large scale mouse genetics experiment continues to provide significant information on changes caused by ionizing radiation in the germ plasma at several dose levels. A proposed expansion to include studies at much lower total dose and chronic exposure levels to begin in FY 1956 was discussed. Dr. Hollaender's staff presented a review of the work under way in each laboratory.

The Mammalian Genetics and Development Project which is under the guidance of Dr. W. L. Russell was thoroughly reviewed.

The sequence of work on nucleic acid and nucleotide identification and the relationships of these substances with coenzymes were described by Dr. Waldo E. Cohn

Dr. Doisy who had been visiting Oak Ridge for two days prior to the Advisory Committee meeting remarked that he so enjoyed talking with ORNL biochemists that he felt he could talk with them for another full day with pleasure because of the quality of the work being accomplished.

Dr. Hollaender told of the Educational Activities of the Biology Division which consists of (a) Traveling Lectureships, (b) Research Participant Program, (c) Teaching at the University of Virginia and at Duke, (d) Oak Ridge graduate fellowships, (e) the plan for

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temporary employees as research associates in the Division, and (f) loan of employees for teaching aid in establishment of radio-biology courses at southern colleges and universities.

Mouse Genetic Work In the Committee's discussion after the presentation of the formal program of the ORNL, two questions were considered concerning the Mouse Genetic Program: (a) Whether it would be advisable to go to quite low total dose studies, at about the 75r level or whether to do the 150r work first, and (b) whether all this mouse work should be done at ORNL or if some phases might be done elsewhere, perhaps even having some dose ranges done at Harwell. It was evident that many more animals and a great deal of difficulty would be encountered with the very low doses. Some hesitancy was shown regarding a marked growth of the program at one location because of past experience with such things as epidemics, fire, or other disasters that could wipe out a total experiment. It was remarked that perhaps we are a little too excited regarding the effects of low doses. ~~Dr. Russell stated that he is worried over the marked sensitivity of spermatogonia and he thinks a 150r experiment is needed.~~ Dr. Russell stated ~~further~~ that by using 150r, he can check on the linearity of dose vs. mutation rate in about two years.

*corrected
meeting
held
9-9, 10-55*

At the close of the session favorable comments were expressed regarding the excellent staff associated with the Laboratory and of the manner in which the programs were presented.

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SATURDAY, MAY 7, 1955, 9:00 A.M.

The Chairman of the Advisory Committee reconvened the meeting with all members present. He asked Dr. Bugher to open the morning session by bringing the Committee up to date on the activities of the Division and the Atomic Energy Commission.

Geneva Conference Dr. Bugher reported on several items including the plans for the Geneva Conference. He stated that Dr. LeFevre has been giving full time in getting the American contribution to the conference established.

Project Troll In connection with Project Troll, Dr. Bugher said that a great amount of analytical work had to be done now that the ship had landed in Japan. Therefore, he had asked Mr. Eisenbud to expand the New York Laboratory by about twelve people in order to take care of the increasing work load which will have to be placed on the biochemists and technicians to make analyses of the incoming scientific material.

Project Wigwam Dr. Bugher reported on Project Wigwam and said that the Commission on April 27 considered the recommendations of the Committee concerning the Project and it took specific action by sending the following letter to the Secretary of Defense:

April 28, 1955

"Dear Mr. Secretary:

You will recall the decision to announce the WIGWAM test three or four days before its occurrence. An announcement has been tentatively scheduled to be released on May 9, 1955.

In this connection enclosed is a copy of a letter dated

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April 23, 1955 and its enclosure dated March 18, 1955 in which our Advisory Committee for Biology and Medicine recommends the announcement of the WIGWAM test well in advance of its occurrence as well as advance notice to certain countries.

We will appreciate being advised whether, after reading the attached, you feel any further consideration should be given to the timing of the public announcement of this test.

Sincerely yours,

(signed) W. F. Libby
Acting Chairman

The Honorable
The Secretary of Defense"

Subsequently Press Releases #635, dated May 9, 1955 and #640, dated May 17, 1955 were made regarding Project WIGWAM.

See Appendix A and B

Congressional Hearings Dr. Bugher then reported on a series of hearings held before the Joint Committee on Atomic Energy with especial reference to one concerning Civil Defense.

A copy of the transcript relating to Civil Defense will be sent to each member of the Committee.

Correspondence A discussion took place on the correspondence which
from
Jack Schwartz the Chairman of the ACEM had received from a "Jack Schwartz" of Branford, Connecticut, concerning a paper which he had circulated to several scientists entitled "Scientist Statement on the Hydrogen Bomb."

Dr. Bugher read into the record a letter from Prof. A. Einstein (now deceased) to Mr. Schwartz recommending that several outstanding scientists be contacted regarding the latter's suggestions.

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No formal action was taken by the Committee on the correspondence which may be found in the central files of the Division.

Test Series Dr. Cantril told of seeing a television broadcast of the
Television recent test series and of listening to a report by

Dr. Alvin Graves concerning fallout. It was suggested that Dr. Graves and persons in charge of the Test Site should be advised that in future interviews they should be emphatic with their statement in saying that fallout was limited to 3.9r per year in the nearby area surrounding the Test Site or in the Test Site and not throughout the United States.

Visit to Marshall Mr. Stanwood presented a written report on his visit
Islands and the
ABCC in Japan to the Marshall Islands for the purpose of reviewing

the facilities of the Eniwetok Marine Biological Laboratory and to review the fiscal and budgetary procedures. Later in the company of Dr. Dunham, he visited the Atomic Bomb Casualty in Japan.

Mr. Stanwood's report reflected that he was pleased with the fiscal set up of the program of the Biological Laboratory.

He told of his visit to the ABCC in Tokyo, Hiroshima and Nagasaki for purposes of reviewing the facilities, general business management, and fiscal and budgetary operations and requirements.

Mr. Stanwood brought out that the housing problem is particularly acute and he made the following suggestions which might help to alleviate the problem:

- (1) Attempt to restrict assignment of personnel to Nagasaki to single people or working married couples insofar as possible.

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- (2) Interest private capital or foundation investment in construction of new homes on a rental reimbursement basis.
- (3) Continue and intensify the search for local housing on a rental basis.
- (4) As a last resort, include an item for housing in the annual budget submission. The earliest this could be done is in FY, 1958.

Mr. Stanwood mentioned that his report on ABCC activities had been prepared on more or less general basis and that the principal points of interest are as follows:

- (1) Facilities at Hiroshima are quite adequate while at Nagasaki Laboratory and administrative facilities are presently adequate but the housing situation is acute.
- (2) Business management and fiscal activities are conducted in a most satisfactory way.
- (3) It is recommended that the work week be extended to conform with generally accepted U.S. practices.
- (4) It is recommended that a recreation and entertainment fund be established under the contract.
- (5) It is recommended that the excess materials procured for the KURE project be disposed of as promptly as possible.
- (6) For the purposes of better analysis and management control, it is recommended that the accounting system be expanded to include the recording of expenditures on a departmental basis.
- (7) It is recommended that after analysis and determination of the scope and level of technical programs to be pursued that the operating budget be revised accordingly.
- (8) It is urged that insofar as possible greater consideration be given to the selection of U.S. personnel under the conditions of employment existing in Japan.

(Copy of the full report may be found in the files of the Division.)

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Atomic Bomb Casualty
Commission

Dr. Dunham reported on his visit to Japan to review the medical facilities of the Atomic Bomb Casualty Commission. After a full discussion of the programs he recommended that if funds are available the ABCC should be given \$1.4 ^{million} as they ^{connected} have requested for the Fiscal Year, 1956. This would enable them with ^{meeting} 9-9, 10-55 some adjustment to keep the internal medicine program at Hiroshima going at the present level, that there be one and one-half pediatricians and five internists, for another year or so, and instead of adding a full time ophthalmologist, that they add another foreign national pathologist to the two they have requested in the budget. He further recommended that the two internists which have been budgeted for be added at Nagasaki, also, one pediatrician and in addition to the present pathologist and the only one budgeted for, they add another foreign national pathologist. Dr. Dunham told of a position posted in the budget under the Director's Office for an associate director at Nagasaki. He said that this person should be much more than a full time administrator, actually he should be available at least half-time as an internist or pathologist. It was the opinion of Dr. Dunham, concurred in by Dr. Holmes, Director of the ABCC and Dr. John Gordon of the staff, that the death certificate study should go full speed ahead. The additional cost of the study would be about \$50,000. and should be completed by March, 1956. Dr. Dunham brought out that pathology must and can be expanded at both Hiroshima and Nagasaki to at least 500 autopsies a year at each place. He stated further that it is the pathology program which in the final analysis is most likely to develop clues as to the means of the shortened life span.

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Also, he said that internal medicine must be related to the pathology program to develop clinical protocols now so pathetically lacking to the pathologist. He believed an expression of confidence in the Director of ABCC is clearly in order, and that the best/^{way}to do it is to make available the \$1.4^{Million} which has been requested for the budget. *Corrected meeting 9-9, 10-55*
In 1957, it should go to \$1.5^{Million}, as for the first time in ABCC history a thoroughly sound medical and pathological program is in progress.

Dr. Dunham felt that the establishment of reactors and isotopes distribution centers would be a wasted effort unless the program itself is immediately placed on a sound basis. He emphasized the fact that though the Japanese are not the best scientists, nor are those at Hiroshima or even at Nagasaki the best in Japan, nevertheless they know mediocrity when they see it and they can be just as critical of an inadequate effort as the best of us.

The Chairman thanked Dr. Dunham and Mr. Stanwood for their thorough and detailed reports on their visits to the ABCC.

Oak Ridge Institute
of Nuclear Studies

Dr. Bugher spoke on the important facets of the ORINS programs and asked the Committee's opinions and recommendations on some of the program aspects in the various sections which Dr. Brucer and his staff had presented on the previous day. Dr. Bugher particularly stressed the importance of the program and he said that while it is a very vigorous one the question of whether Dr. Brucer should be permitted to expand his interest to other than cancer research ought to be considered.

Dr. Bugher told the Committee that some time ago, Dr. Brucer had wanted to launch into a strontium program and that he had objected to it for

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the reason that at the present time we have three sizeable research projects concerned with strontium.

Dr. Bugher asked the Committee for comments as to whether Dr. Brucer is pushing ahead as emphatically as may be possible on the cancer program, or are other interests which have been added to the Laboratory consuming too much time and whether he should be encouraged to extend his thyroid iodine observations.

A full discussion ensued. Dr. Warren said that he would regret to see too great a distraction from the cancer program. It is one in which the citizens of the country as a whole expect the AEC to be diligent. Dr. Cantril stated it would seem that Dr. Brucer's greatest contribution would be in further exploration of uses of radioisotope materials for internal radiation.

Dr. Warren pointed out that one particular advantage that ORINS has - together with Brookhaven and to a lesser extent Argonne, is the availability of short lived isotopes for cancer research.

Biology Divison
Oak Ridge National
Laboratory

The program in biology which is under the direction of Dr. Alexander Hollaender was extensively reviewed. It was the impression that a well-integrated program was being developed in a competent and aggressive fashion.

Dr. Bugher indicated that the Division of Biology and Medicine is faced with making several important decisions as to the expansion of the mouse genetic program on the one hand and the further extension of interest in protective substances against radiation on the other.

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He spoke of the real need for more active information concerning various levels in radiation exposure in mice.

In the study of Dr. Russell's program, it was brought out that he had shown some enthusiasm for doing a study on mice with exposure of 150r, but fairly obvious reluctance to take up a study of lower (75r) exposure level with which the AEC is also concerned.

Therefore, Dr. Bugher asked the Committee for their advice and counsel upon expanding the mouse genetic program.

In this connection the Committee recommended that a small committee be asked to meet and to appraise the present program and determine whether it is advisable to obtain the information on the low exposure level - 150r down to the lower dose of 75r.

Accordingly, the following two resolutions were adopted, the first with particular reference to certain projects at ORNL, the second bearing on the overall genetics program.

It was resolved that:

1. "In view of the growing awareness of the extreme importance of protection against radiation and the use of recovery agents to minimize injury, it is recommended that this work be expanded."
2. "That the genetics program be expanded substantially in order to provide the data needed in mammalian genetics."

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University of Tennessee-
Atomic Energy Commission
Research Program The program of research at the University of
Tennessee which the Committee and Dr. Stakman

had visited the day previously was reviewed.

In discussing the program it was brought out that the gamma radiation field at the University of Tennessee is unique in that it is perhaps the only AEC facility specifically designed to irradiate large animals (burros) with a view toward the possible relevance of the research results to certain human systems and responses. The Committee was of the opinion that the program is well conceived and that it is quite acceptably executed.

Therefore, upon a motion by Dr. Warren, seconded by Dr. Doisy, the following resolution was approved unanimously:

It is recommended that the AEC should continue their support of the UT-AEC agricultural research program and it was suggested that a small committee be appointed to consider ways in which even greater advantage might be taken of the unique facilities.

Genetic Consideration
of Atomic Weapons Tests The Committee held a special meeting on
Saturday, April 23, 1955 to consider the
present status of research in the field of radiation genetics and implications for the radiation genetic hazard of mankind. At this meeting the Committee again reviewed the state of their knowledge concerning the genetic effects of ionizing radiation with particular reference to the problem in relation to radioactive fallout from atomic weapons. The following statement in which all the members concurred represents their best analysis of the problem and their considered opinions based on all of the evidence which has been collected.

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"GENETIC CONSIDERATIONS OF ATOMIC WEAPONS TESTS"

"One of the important tasks of the Division of Biology and Medicine of the U. S. Atomic Energy Commission has been the safeguarding of the public against the effects of atomic radiation. The Advisory Committee for Biology and Medicine, consisting of independent scientists from various institutions throughout the country, share this concern.

"The ability of radiation to change the genes, the hereditary material of mankind, has been a topic of much public discussion. In view of the widely contrasting opinions which have been voiced, the Advisory Committee wishes to point out the following facts and estimates.

"1. The AEC from its inception has supported a large number of studies on animals and plants in order to increase knowledge on the genetic effects of radiation, particularly on mammals. These studies, conducted in numerous universities and research institutes, have been freely published in the scientific literature. The AEC has also supported the extensive investigation carried out, under the auspices of the National Academy of Sciences, on the survivors of Hiroshima and Nagasaki and the children born to them.

"2. Experiments on animals and plants and observations on man show that mutations occur spontaneously at all times. Most of these mutations act unfavorably on the development, growth or well-being of individuals. The spontaneously mutated genes have accumulated in large numbers in all human populations. Their presence accounts to a considerable extent for the fact that at least one percent of all new-born exhibit developmental abnormalities, most of them to a very slight degree but some in a more serious way.

"3. Irradiation of animals and plants adds to the number of more or less detrimental mutations. Human genes must be considered as being equally subject to the mutagenic effect of radiation. Indeed, a considerable fraction of the so-called spontaneous mutations of man are probably caused by the natural background irradiation from cosmic rays, soil and food.

"4. The radiation produced by fall-out from atomic weapons tests as well as from present and future peaceful applications of nuclear energy will result in additional mutations in human genes. The number of these cannot be estimated accurately at this time. At the current rate of irradiation from fall-out, among the four million children born each year in the United States, perhaps from a hundred to several thousand may carry as a result of this irradiation a mutated gene. At most, a small percentage of these genes will produce any noticeable effect in the first generation. Only slowly, over hundreds of years, will the majority of these radiation-induced genes become apparent, in a few individuals at a time, usually by causing a less than normal development or functioning of the person concerned. It will be impossible to identify these individuals among the large number of

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similar ones, affected by genes already present in the population due to accumulated spontaneous mutations.

"5. No measurable increase in defective individuals will be observable at any time as the result of current weapons' tests, since the few radiation-induced defectives will not change measurably the number of about 40,000 defectives who will occur spontaneously among the four million births of each year in the United States. It may be pointed out that no significant change in the percentage of malformed children has been observed among those conceived after the war whose parents had been exposed to the atomic bombs in Hiroshima and Nagasaki.

"6. The foregoing conclusions apply only to the genetic effects of weapons' tests carried out at the present level and of foreseeable peacetime uses of atomic energy. The genetic effects of a generalized nuclear war would be one of many catastrophic consequences of such a disaster.

G. Failla, Chairman
Shields Warren, Vice-Chairman
C. H. Burnett, Member
S. T. Cantril, Member
E. A. Doisy, Member
Curt Stern, Member

May 12, 1955"

Note

The above statement was transmitted to the Chairman of the AEC, on May 12, 1955.

Next Meeting The next meeting of the Advisory Committee for Biology and Medicine is scheduled to be held on Friday and Saturday, September 9 and 10, 1955, at the Atomic Energy Commission in Washington, D.C.

Vote of thanks Dr. Burnett proposed and the Committee concurred that a vote of thanks for the hospitality extended to them during their visit to Oak Ridge be sent to -

Mr. Clark E. Center, Vice President
Carbide and Carbon Chemicals Company

Mr. S. R. Sapirie, Manager
Oak Ridge Operations Office

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Dr. William G. Pollard, Executive Director
Oak Ridge Institute of Nuclear Studies

Dr. Woodruff thanked the Committee for holding their meeting in Oak Ridge and he said that he hoped that the Committee would plan to hold another meeting there in the not too distant future. At the conclusion of Dr. Woodruff's remarks the Committee went into Executive Session.

Executive Session During the Executive Session, the Chairman asked for names of persons to be considered as nominees to replace Dr. Curt Stern who was retiring from membership on the Committee on June 30, 1955.

The nominees are:

Dr. H. Bentley Glass
Dr. Wilson S. Stone
Dr. Karl Sax

It was the recommendation of the Committee that an appointment should be proffered to Dr. Glass by the Chairman of the Atomic Energy Commission, effective July 1, 1955.

Dr. Stern's retirement Dr. Stern expressed a few words regarding his association with the members of the Committee and said that it had been a real privilege and pleasure to serve with them as well as one of the exciting experiences of his life.

The Chairman thanked Dr. Stern for his kind remarks and his splendid services to the AEC and the Division of Biology and Medicine and expressed gratification that upon his retirement as a member of the Committee, he will continue to serve as a consultant.

The meeting adjourned at 5:30 P.M.

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