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MINUTES

58th MEETING OF

A. E. C. ADVISORY COMMITTEE ON BIOLOGY AND MEDICINE

PLACE: *Brookhaven National Laboratory*

DATE: *November 16 and 17, 1956*

The fifty-eighth meeting of the Advisory Committee for Biology and Medicine was held at the Brookhaven National Laboratory on November 16 and 17, 1956.

The meeting proper held on September 22 was preceded on the 21st by a presentation of the Brookhaven scientific programs in biology, medicine, instrumentation and health physics. The details of the Brookhaven program appear in Appendix A. Abstracts of the papers presented and important comments or questions raised by Committee members are on file. The Laboratory Director, Dr. Leland J. Haworth presented an after-dinner talk on the subject of cooperation in research as it is applied by the Brookhaven National Laboratory and its associates.

On November 17 the Committee meeting convened at 9:00 a.m. with Dr. G. Failla presiding. The following persons were present:

A D V I S O R Y C O M M I T T E E

Dr. G. Failla, Chairman

Dr. Shields Warren, Vice Chairman
Dr. John Bugher
Dr. Charles H. Burnett
Dr. Simeon T. Cantril
Dr. H. Bentley Glass
Mr. Hanson Blatz, Scientific Secretary

STAFF, DIVISION OF BIOLOGY AND MEDICINE

Dr. Charles L. Dunham
Dr. Charles W. Shilling
Dr. Forrest Western
Mr. Howard C. Brown, Jr.
Dr. Harry D. Bruner
Mr. Robert L. Butenhoff
Dr. Gordon M. Dunning
Dr. Sterling Emerson
Dr. Paul B. Pearson
Dr. Allyn Seymour
Miss Kathryn Weichold
Mrs. Frances R. Montgomery, Secretary

OTHER, AEC

Mr. Merril Eisenbud, NYOO
Dr. S. Allan Lough, NYOO
Mr. Emery L. Van Horn, Brookhaven Area

STAFF, BROOKHAVEN NATIONAL LABORATORY

Dr. Leland J. Haworth, Director
Mr. Gerald F. Tape
Dr. Robert A. Conard, Jr.
Dr. Howard J. Curtis
Dr. Frederick P. Cowan
Dr. J. B. H. Kuper

Mrs. G. Failla, Columbia University

The meeting was turned over by the Chairman to Dr. Dunham for the presentation of the progress report of the Division of Biology and Medicine. Dr. Dunham distributed the two long awaited reports* covering the surveys done of the Marshall Island natives after the fallout incident during the "Castle" test series.

DBM CURRENT ACTIVITIES

DR. DUNHAM reported on the activity for the past two months which included many international visitors and also the problem of strontium fallout. The recent political campaign had resulted in many inquiries on the subject. He also reviewed briefly the current routine activities of Dr. Dunning in cooperation with AFSWP group and the Sandia group on the plutonium problem and also the northern and southern hemispheric monitoring. A symposium is planned in the near future on the short-term effects of fallout. DR. DUNHAM reported on the recent biomedical program Directors' meeting at Idaho Falls and the particular interest in the implementation of the new radiation dose limits.

An attempt is being made to correlate the American (gummed paper) method of collecting fallout with that of the British (rainoff collected in pots).

The Weapons Effects Handbook which is about ready to go to press is being held up in the consideration of a chapter on long-term fallout hazards. This is being prepared by Dr. Libby assisted by Dr. Western and Dr. Dunham. In addition there was a substantial contribution to the next Semi-annual Report to Congress which is being prepared. Dr. Claus and Dr. Albert have had the primary responsibility for this.

DR. FAILLA warned of the tendency to relate occupational dose to the very low doses reported by certain groups such as at the Hanford Works and the Oak Ridge National Laboratory which are not representative of the whole program.

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* "Some Effects of Ionizing Radiation on Human Beings", edited by E. P. Cronkite, U. P. Bond and C. L. Dunham

"Medical Survey of Marshallese Two Years After Exposure to Fallout Radiation", by R. A. Conard, Bradford Cannon, C. E. Huggins, D. B. Richards and Austin Lowery (BNL 412-T-80)

ICRP AND NAS LIMITS

There followed a considerable discussion of the relationship between the ICRP and NAS recommendation of 50 r in ten years and the working level of 5 r per year as a target. The psychological and legal considerations in removing a worker from his occupation after having received his maximum recommended dose limit was considered. The importance of considering this a target level rather than an absolute limit was discussed. It was DR. GLASS'S opinion that the practical problems involved should be presented to the NAS Committee.

DMB CURRENT ACTIVITIES (continued)

DR. DUNHAM spoke briefly of the ABCC. Dr. Keith Cannon is in Japan but will return soon. He called attention to the recent commendation given to Mrs. Montgomery, Mr. Van Horn and Mr. Clarke for their outstanding performance. The Committee unanimously passed a resolution recognizing the Commission's action and expressing pleasure. (A copy of the resolution has been sent to each of the recipients.) DR. DUNHAM spoke also of the visit of Dr. Plough and Dr. Stern to Japan during the Summer and their audience with the Emperor. In this connection DR. GLASS spoke of the favorable reaction to the presence of fifty Americans at the Tokyo conference and expressed the opinion that the funds were well spent in sending them.

DR. DUNHAM reported on the 202 hearing coming up during which the Commission will report to Congress on the industrial exploitation of atomic energy. This will involve considerable staff work in connection with the safety program. DR. DUNHAM also reviewed briefly the establishment of the International Atomic Energy Agency, the special reactor hazards study being carried out at BNL with the assistance of Dr. Claus, Mr. Eisenbud and Mr. Mc Laughlin of the HASL. Mention was made of Mr. Eisenbud's talk given on November 15 at the Washington Academy of Sciences. DR. PEARSON has been invited by the State Department to represent the United States at the coming meeting of the Food and Agricultural Organization in Holland.

DR. DUNHAM discussed the budget which appears quite adequate for 1958 but presents immediate problems because of the pressure among contractors for increases in salaries as well as other expenses.

DBM BUDGET

DR. WARREN emphasized the need for much of the research information now, and asked if the ACBM could offer any assistance in the way of a statement or resolution in order to avoid losing seven or eight months in the research program through delayed expansion. Further discussion of this resulted in the preparation of a resolution as follows:

> The ACBM reviewed with the staff of the Division of Biology and Medicine not only the Division's traditional duties, but also those many special additional responsibilities demanded by the present situation ot envisaged eighteen months ago when the present personnel ceiling and budget were prepared. The Committee believes that under present circumstances, the Division cannot continue to deliver the present high standard of guidance of health policies and the provision of factual data without immediate reinforcement.
>
> We note with satisfaction that this situation has been recognized for Fiscal Year 1958 and that in the last few days additional funds have been assured for 1958. However, the present situation as to funds, personnel and space, has been rendered acute by the emergent demands placed on the Division by its crucial role in determining the long-range effects of radioactive fallout and related matters.
>
> The immediacy of these requests requires action now.

The resolution was passed unanimously.

DR. DUNHAM introduced the question of pulling together all the available information on internal radiation exposure such as that received by individuals having received radium therapeutically or incidentally. This matter had been a subject of a letter from Dr. Libby in which he suggested that Dr. Baird Hastings or Dr. A. K. Solomon might assume this responsibility. There was considerable discussion of the great need for such data which are available from many sources.

INTERNALLY DEPOSITED RADIOACTIVE MATERIALS

The work being done by Marinelli was discussed and the need for an expanded program of this type was agreed upon.. DR. BUGHER discussed the various means of accumulating data including the work being done by Marinelli, the Los Alamos group, the Hanford group and Dr. Robley Evans of MIT and pointed out the fund of information would be very valuable in reevaluating the permissible levels.

DR. WARREN reviewed the status of the UN Scientific Committee on the Effects of Atomic Radiation which has a lively interest in this problem and is working on a compilation. This is not, however, on a crash basis but in relation to the multiple other interests of the Committee. DR. WARREN agreed that someone should be given the responsibility for assembling the available data for the ACBM but suggested that the selection of the few logical choices would result in the interruption of a vital program. He suggested that someone not actually working in the field but with the background and ability to appreciate it would be a better choice. DR. DUNHAM suggested that the first step would probably be to call a meeting of Eisenbud, Brues, Marinelli and Hursh to review the problem and then decide the quickest and most effective approach. DR. FAILLA suggested that Dr. Robley Evans would be an appropriate choice. The long-term project at Utah was pointed out by DR. DUNHAM but he said that there would be no answer from this source for fifteen years.

The Chairman then called upon DR. WARREN to review the second meeting of the UN Scientific Committee on the Effects of Atomic Radiation.

UNITED NATIONS SCIENTIFIC COMMITTEE ON THE EFFECTS OF ATOMIC RADIATION

DR. WARREN suggested that the meeting started under auspicious circumstances but deteriorated rapidly. The most important activities had been the establishment of a continuing secretariat and staff. He pointed out some of the continued Russian deemphasis on genetic effects and an emphasis on neurophysiological mechanisms. He spoke of the spontaneous motion of approval of the U. S. contribution. There had been an extensive discussion of the genetic problem and the recent United States and British reports but all of the delegates concluded that while the

UNITED NATIONS SCIENTIFIC COMMITTEE ON THE EFFECTS OF ATOMIC RADIATION (continued)

recommendations were desirable they were also impractical. He spoke of the project being initiated to look into the recording of medical x-ray dose through the ICRP. The final report of the Committee is expected by July 1, 1958. Dr. Warren then asked Mr. Eisenbud to present his impressions becuase of his activities during the meeting. MR. EISENBUD commented on reports of very high radiation backgrounds in India and Brazil and also of the interest in the accumulation of data on the disposal of radioactive wastes in the ocean. A UN Scientific Committee resolution was passed to accumulate records on the industrial wastes but to ignore fallout from weapons tests. DR. FAILLA asked for some of the details about the high Brazilian and Indian exposures and numbers of people involved. It appears as if there are hundreds of thousands in Brazil and four million in India subject to high radiation levels. DR. WARREN said that the Indian groups are quite clearly divided between those of the fishing population living on river banks and deltas where the monazite sand occurs and others living further inland and occupying the farming regions. This should offer sound controls between two entirely different soil backgrounds. A lengthy discussion followed in which many suggestions were made for obtaining more data on these exposures. A problem exists, however, in that the countries concerned would probably resent any aggressiveness on the part of the United States to assist in obtaining data. DR. WARREN suggests that we can be of the greatest help in the training of native scientists.

DR. FAILLA discussed the request by the United Nations for the ICRP to study the recording of x-ray exposures and that a first report would be made in April, 1958 at the next UN Scientific Committee meeting. DR. GLASS pointed out that at the radioiodine conference in Chicago, the recent estimate by the NAS Committee on exposure received during thyroid treatment was found to be incorrect as far as genetic effects are concerned because of the fact that most such radio-iodine patients are not treated unless they are at least forty years old. This contribution to the 3 r estimated by Pullman and Laughlin would probably be very small. DR. FAILLA said that Laughlin and Pullman were increasing their estimate to about 5 r but that the real value would not be known for some time.

DR. EMERSON was then asked to discuss the report by Neel and Schull on the genetics study on Japanese children. He distributed a chart which was discussed. DR. GLASS raised some questions about the statistics and suggested slight modifications. After a considerable discussion of the report of Neel and Schull and the inconclusiveness of their study, it was agreed to avoid misleading statements about the conclusions. Since this report is being discussed in the forthcoming Semi-annual Report, the exact wording is important since the report has such widespread distribution and because of the current UN Scientific Committee consideration of such problems. DR. GLASS expressed strong opposition to any summary or conclusion in the Semi-annual Report with the emphasis that Dr. Neel had given to it regarding the lack of genetic effect without any compensating considerations. DR. WARREN suggested that the initial summary use the exact words followed by the statement that: "However, the staff of the Division of Biology and Medicine feels that the following viewpoint should be presented", _ _ _ _. DR. DUNHAM suggested asking Dr. Neel to approve the first and last sentence but avoid detailed discussion. A further discussion followed to which the matter of whether any official statement by the AEC had yet been made regarding the genetic effect of the radiation from the bombs. It was the general concensus that the AEC had not made any conclusive statements. DR. BUGHER warned against making any statement that the newspapers could pick up as a matter of disagreement between the AEC and a scientific report. DR. GLASS expressed concern about putting any statement in the Semi-annual Report that would increase public apprehension further.

GENETIC STUDY OF JAPANESE

DR. WARREN expressed the opinion that it would be improper for the AEC to put interpretations on the work of a competent investigator. Further discussion concluded in the suggestion that Dr. Emerson visit Ann Arbor to obtain some agreement with Dr. Neel.

DR. DUNNING was then asked to present his report on radioactive contamination of Pacific areas, the outline of which appears as "Appendix B". After Dr. Dunning's report (augmented by Dr. Conard who had actively participated in the study), Dr. Dunham asked for any comments from the Committee concerning the return of the natives to Rongelap. The current low morale of the natives was pointed out and the advantages of returning them to their homes presented as a factor which should be balanced against the possible radiation hazard in their return. It had been suggested by Dr. Conard that they be permitted to return in April or May, 1958. Further discussion followed as to means of continuing the monitoring of these natives and also those from the Island of Uterick for

RETURN OF RONGELAPESE

RETURN OF RONGELAPESE (continued)

comparative purposes. DR. GLASS expressed the opinion that he believed that the benefit of returning them is inclined to outweigh the danger and that it would be unrealistic to base conclusions on the dose levels intended for a large population to this relatively small group, even though it is an entire population. DR. FAILLA pointed out that the ICRP limit of 0.5 r per year is not intended to be the limit for a large population. It was agreed that because of the already relatively high exposure to which these natives had already been subjected, limiting their exposure in terms from now on was unrealistic; but on the other hand, the psychological effect of permitting them to receive more radiation than our own people, could be subject to criticism. A further discussion resulted in the decision to prepare a statement expressing the Committee's opinion. A statement was subsequently prepared as follows:

> It is moved that the ACBM approve the Division of Biology and Medicine's proposal to return the Rongelapese to their native atoll. However, it is the opinion of the ACBM that if it should become necessary to re-evacuate because of further tests, there would result world opinion unfavorable to the continuation of weapons testing.

The resolution was unanimously passed.

The meeting recessed for lunch at 1:20 p.m..

At 2:10 p.m. the meeting was reconvened by the Chairman who called on Dr. Seymour to discuss the evaluation of concentrations in the ocean following Operation Redwing. DR. SEYMOUR told of the recent meeting in Washington for the purpose of discussing surveys. This was attended by Japanese and also members of the AEC Division of International Affairs who agreed to exchange information and meet later for the purpose of coordinating results. DR. SEYMOUR spoke of the many different phases of the program involving the sampling of water, plankton, and fish being carried out by both Japanese investigators as well as our own. There has been some disagreement between the Japanese and the American

PACIFIC OCEAN SAMPLING

PACIFIC OCEAN SAMPLING (continued)

results which, however, have not been serious. There was some discussion of the finding of Co-60, Zn-65 and Fe-59 in marine materials. DR. SEYMOUR concluded by describing the two-volume report of the Japanese data recently published by the English.

BNL REACTOR HAZARDS STUDY

MR. JEROME TAPE of the Brookhaven National Laboratory was then introduced to tell of the reactor hazards study under way at Brookhaven. He spoke of its initiation as a result of a request by the Joint Committee for information. The purpose of this report is to determine as nearly as possible what the damage would be in case a reactor were to be involved in a serious disaster. The problem has been based upon two possibilities; one, as a runaway in which all of the fission products are contained within the sealed building and the other, is the case in which there is a breach of the container by which all of the fission products escape. The final report of this study will be ready by January 1, 1958 but much of it will probably be in the nature of suggesting further studies.

NEVADA OFFSITE RADIATION LEVELS

DR. DUNNING was then asked to present the proposed offsite radiation levels for weapons testing. He distributed the staff paper (141-33) which presents the figures given to the ACBM at the last meeting. DR. DUNNING expressed the opinion that the weapons group can conduct the necessary tests within the limits of these criteria. DR. DUNHAM asked that the recommendations be considered by the Committee. After a brief discussion, it was moved that a statement be prepared and submitted as follows:

> The trend in thinking of the International Commission on Radiological Protection, The National Committee on Radiation Protection, and the National Academy of Sciences is toward more restrictive criteria for standards of radiation protection.
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> In light of the above, it is recommended that radiological safety criteria for exposures to gamma radiation from fallout to populations around

NEVADA OFFSITE RADIATION LEVELS (continued)

the Nevada Test Site should be as follows:

a. The current criterion of 3.9 roentgens for any one year; plus an additional restriction of

b. 10 roentgens in a period of 10 years, with the first of the successive ten-year periods starting in the spring of 1951.

These should be construed to be operational guides rather than maximum permissible limits, since exposures somewhat in excess would not be hazardous.

The above summary is approved in view of the Committee's opinion as to the necessity for continued weapons tests.

The resolution was passed unanimously by the Committee.

PROJECT SUNSHINE

DR. FAILLA then introduced the subject of Project Sunshine. He reviewed particularly the work done to date, the reports by Dr. Libby and Mr. Eisenbud. He also reviewed the basis on which the maximum permissible body burden of Strontium 90 was established. Dr. Libby has suggested an estimated ultimate burden of from 4 to 10 $\mu\mu$ curies Sr-90 per gram of Calcium as the average for the U. S. and Mr. Eisenbud has suggested 25 as the average for North Dakota in which the fallout has been higher than for the rest of the U. S. An extensive discussion followed in terms of the uptake and distribution of Strontium 90 in different parts of the world and its relationship with the known effects of radium in the body. DR. FAILLA pointed out that the values suggested by Dr. Libby and Mr. Eisenbud appeared to be in reasonably good agreement and were based upon the best information available to date. There was much evidence to indicate that the accepted maximum permissible body burden might be too conservative. He did, however, point out that the Commission was under obligation to use the nationally accepted limit. It would, however, not be wise for the Commission to suggest a revision of the limit, since its motive might be questioned.

PROJECT SUNSHINE (continued)

A further discussion of the problem and a review of the two reports indicated that it would be impossible for the Committee members to arrive at any specific comment or statement on this subject without further study. It was agreed, therefore, that a special meeting be held in about a week in order to discuss the question and prepare a resolution for submission to the Commission. Such a meeting was called for November 26 to be held in Washington, D. C.. It was also agreed that certain experts in the field should be invited to attend; including Dr. Brues and Mr. Marinelli, Dr. K. Z. Morgan, Mr. Eisenbud and Dr. Libby.

The open meeting was adjourned at 4:15 p.m. after which the Executive Session was called with only the Committee Members, Dr. Dunham and the Secretaries present.

EXECUTIVE SESSION

The three resolutions were reviewed and because of their urgency, it was agreed that they be prepared immediately and transmitted to Commissioner Strauss in advance of the regular letter. (They were prepared, signed by the Chairman and mailed on November 19th.)

The minutes of the 57th meeting held on October 21 and 22, 1956 were approved subject to minor corrections.

DR. DUNHAM reviewed briefly the New York University proposal relative to the New York Health and Safety Laboratory and also discussed the proposed DBM reorganization. He also mentioned the suggestion that has been made for the change in the name of the DBM but it was agreed that at present there appears to be no satisfactory title which would be descriptive and still be brief enough to be useful. In response to a question raised by DR. FAILLA about the proposal that the ACBM be made a statutory Committee, DR. DUNHAM stated that there had been some objection to this on the part of the GAC.

DR. GLASS asked if the DBM has been consulted in policy matters of health and safety with regard to the issuance of permits to construct power reactors. He suggested that the ACBM discuss such policies at a future meeting. DR. CANTRIL raised the question of the effective transmission of information to the general public and it was proposed that this subject be raised for discussion at the January meeting. It was agreed that the next meeting would be held on January 17, 18, and 19 at Berkeley, California and would include a visit to the Livermore project.

A memo from Philip J. Farley, Acting Director, Office of Special Projects, AEC to Dr. Dunham on the meeting of the US and UK scientists on the biological effects of radiation in oceanography and fisheries was read but no action was taken.

The meeting was adjourned at 5:10 p.m..

Respectfully submitted,

Hanson Blatz
Scientific Secretary ACBM

APPENDIX A

BROOKHAVEN NATIONAL LABORATORY
RESEARCH PROGRAM IN BIOLOGY, MEDICINE,
INSTRUMENTATION AND HEALTH PHYSICS

Friday, November 16, 1956

Biology Program

General Survey of Work in the Biology Department	H. J. Curtis
Nucleic Acid Metabolism	P. S. Woods
Mammalian Radiobiology	H. Quastler
Physiological Cytogenetics	D. M. Steffensen
Tour of Biology Building	

Medical Program

The General Program of the Medical Department	Lee E. Farr, M.D.
Biochemical Studies in the Medical Department	F. M. Sinex, M.D.
Heavy Particle and Gamma Irradiation of Mammals	V. P. Bond, M.D.
Tritium Incorporation in Cell Structures	W. L. Hughes, M.D.
Activation Analysis - Its Application to Medical Problems	G. C. Cotzias, M.D.

Health Physics and Instrumentation Program

Present Status of the Health Physics Program	J. B. H. Kuper
Research and Training Programs in Health Physics	F. P. Cowan
Current Safety and Waste Disposal Problems	Lee Gemmell
Dosimetry Problems at the Cosmotron	J. S. Handloser

NOTE - Brief abstracts of all of the papers presented with a record of important questions asked by Committee members and the answers given are a matter of record and are in the files of the Scientific Secretary.

APPENDIX B

RADIOACTIVE CONTAMINATION OF PACIFIC AREAS *

I. EXTERNAL GAMMA RADIATION

II. GROSS ACTIVITY

- A. Land Plants
- B. Marine Organisms and Birds
- C. Soils
- D. Water

III. RADIOCHEMICAL ANALYSIS

IV. INTERNAL CONTAMINATION OF ANIMALS

V. RESIDUAL ACTIVITY IN PACIFIC OCEAN - Operation Troll

VI. RETURN OF RONGELAPESE

- A. Physical Status of Rongelapese
- B. External Gamma Dose Rates on Rongelapese Atoll
- C. Food Supply
- D. Additional Considerations

* Outline of material by Gordon M. Dunning