

August 6, 1971

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TRIP REPORT - VISIT TO INSTITUTE OF ENVIRONMENTAL MEDICINE, NYU MEDICAL CENTER, STERLING FOREST

I. Site visit at Laboratory for Environmental Studies

The primary purpose of this visit was to review the work being conducted under contract No. AT(30-1)-3086. Site visitors were Dr. John Hursh from the University of Rochester and Dr. Richard Cuddily from the Lovelace Foundation and myself. Dr. William Osburn from ESB was also expecting to attend but he had a last-minute change in plans. Our meeting on Wednesday, July 28, 1971 was held in a conference room at the laboratory.

Dr. Eisenbud began by clarifying his own status. During his 1968-1970 leave of absence, the Laboratory was directed by a troika consisting of Drs. Wrenn, Kneip and Laver. This system functioned successfully and is being continued at the present time. Dr. Eisenbud spends half-time with the University and half-time with a private company (Environmental Analysts, Inc.) he has formed with three other scientists, B. Holaday, A. Stern and Fitzpatrick. Because of the heavy involvement of Dr. Wrenn in this contract, Dr. Eisenbud proposed to submit the next renewal proposal under the names Wrenn and Eisenbud instead of the current Eisenbud and Wrenn. In a general analysis of past research directions, he indicated that the laboratory might typically study various aspects of a given problem for 3 to 5 years before moving on to new research areas. Examples of this were studies generally related to iodine and more recently to lead.

This general introduction was followed by informal presentations of recent results in several areas:

A. Attachment of Radon Daughters to Aerosols as a Function of Particle Size - Wrenn

The Whitley Mobility Analyzer was used to study the attachment of RaA, RaB and RaC to aerosols. It was found that the probability of attachment for all three daughters was a function of the radius squared in agreement with kinetic theory. This extended and confirmed previous results presented by Raabe for RaB.

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B. Development of a Cumulative Radon Dosimeter - Costa - Ribeiro

A passive device designed to quantitate radon levels (without daughters) was described briefly. The readout is a density change on a piece of film. Unfortunately, the film has a non-linear response over the relatively large activity range investigated. However, it may be that in actual usage in a mine, the range of activity levels will be smaller and the device sufficiently linear. Its main advantage is the lack of moving parts, a proven weakness of many other current devices.

C. Development of Large Area In Vivo Detectors - Rosen

The original 8-inch diameter sandwich crystal developed in this laboratory had a thin layer of CsI on top of a 2-inch thick slab of NaI. Subsequent developments have shown that a 6-inch diameter detector with a thin layer of NaI on top of CsI gives better results. Prior to having a pair of the 6-inch diameter NaI/CsI crystals manufactured, various pieces of beryllium were counted in order to obtain the best possible material for the crystal faces. This was important because the high rate of recycling in the beryllium industry has produced some lots with relatively high background activity. The suggestion was made that the AEC consider purchasing a stock pile of clean beryllium to insure that future users would have the best material to work with.

D. Long Term Measurements of ^{210}Pb in Man - Wrenn

Dr. Wrenn briefly reviewed the results to date related to the assessment of ^{210}Pb in uranium miners. It was originally proposed that every uranium miner be assayed for skeletal ^{210}Pb using external counting with sandwich detectors. Because of economic restrictions, this has not been possible to date. Instead, operations have centered on the counting of a selected group of retired uranium miners in the Salt Lake City area performed by NYU at the University of Utah with the cooperation of Dr. C. Mays and associates. The most recent counting expedition occurred in November 1970. At that time, 29 miners and 8 control subjects were counted with a pair of NaI/CsI detectors. Attempts were made to correlate these skeletal ^{210}Pb measurements with values for cumulative working level months (CWL), blood ^{210}Pb and urinary excretion of ^{210}Pb . The correlation for blood and urinary ^{210}Pb . Many factors can influence the significance of skeletal ^{210}Pb measurements including dietary intake of ^{210}Pb , heavy smoking, the effective half-life of

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G. ¹³⁷Cs in Jamaican Milk - Wrenn

A continuing milk and grass sampling program in Jamaica has shown that soil low in potassium causes high uptakes of ¹³⁷Cs by grass. In wet lateritic soils such as are found in Jamaica, the dose commitment appears to be a function of the total deposition and is therefore much higher than in the United States where the dose commitment is a function of the deposition rate.

H. Other Work - Eisenbud

Dr. Eisenbud discussed work on environmental radioactivity in Brazil. Also in regard to recent renewed interest in measuring radium levels in plants and soils, he recommended an international exchange of samples for analysis in order to standardize analytical techniques. Can this be done by IAEA with the encouragement of DEM?

I. Future Experimental Directions

1. Additional baboons will be added to the ²⁴¹Am experiment to furnish tissue distribution data for other sacrifice times.
2. Studies on ²¹⁰Pb will continue on the two long-term baboons and in a selected volunteer group of retired uranium miners. One of these miners will be brought to the NYU laboratory for more extensive excretion analyses this fall.
3. A systematic study of the metabolic behavior of injected trans-uranic elements in the baboon was proposed. These studies might involve 6 or 8 baboons per radionuclide and would be designed to compare the resulting distribution and excretion data for these primates with existing data for other laboratory animals such as dogs, rats and mice.

J. Comments

Detailed written comments are expected from the two outside reviewers in the near future. From my own point of view, I found the work to be of considerable interest and importance. Dr. Eisenbud is fortunate to have a young, dedicated staff that is capable of, and interested in, work of relevance to DEM. It was apparent that the graduate studies program continues to serve as a source of bright and creative researchers. A brief review of the thesis topics for those students who have been granted M.S. and Ph.D. degrees reveals a strong association with current relevant problems such as the in vivo assessment of radionuclides emitting soft, penetrating radiations and ²¹⁰Pb metabolic studies in the adult baboon. The laboratory

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the work done here by Dr. Cuddihy et al. from the

facilities seemed adequate and well-equipped although Dr. Eisenbud noted that because of budgetary restrictions, equipment replacements during the past few years have been minimal. One equipment item which should be considered in the near future is a second pair of sandwich crystals. Much of the proposed future work involves skull counting with a pair of 6-inch diameter NaI/CsI crystals. Since there is only one pair available, work at NYU will cease while the crystals are in Utah to count uranium miners. Also, if one of the crystals becomes damaged, there is no back-up replacement on hand.

The future research directions indicated two general areas: continued assessment of ^{210}Pb in uranium miners and a systematic assessment of the metabolism of the transuranic elements in the baboon. The relative merits of counting all uranium miners once or studying a selected group more intensely is a debatable point. However, it is an opportunity that may not be available again and perhaps this possibility should be reconsidered if the counting system is shown to be sufficiently sensitive. The rationale for embarking on a series of metabolic studies of the transuranic elements in the baboon is that this primate may disclose differences from results seen in non-primate laboratory animals that might enhance the extrapolation of all the data to man. Before other radionuclides are started, the ^{241}Am data should be carefully evaluated to determine what new and useful information was derived from the baboon. It is planned that these radionuclides will be administered by intravenous injection. Because of the known difficulties with chemical form (monomeric, polymeric, etc.), it is conceivable that some observed metabolic differences may result from sources other than species differences. When this was discussed with the NYU group, they mentioned the possibility of including a parallel group of rats. I suggested using a few dogs to tie the work in with our extensive long-term studies at other laboratories. This suggestion was not met with a great deal of enthusiasm but I think it is an important point. Differences between dog and rat data have been observed in the past so it would not be unusual to see differences between the baboon and rat data but the significance might remain undetermined. A general plea was made by Dr. Eisenbud for an increased level of funding on the basis that a group of qualified investigators is available to carry on additional scientific investigations of current interest to DEM. Although such a possibility seems remote at this time, this should be kept in mind when future problems arise that would be suitable for this laboratory to tackle.

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II. Visit to Laboratory for Experimental Medicine and Surgery
in Primate (LEMSIP).

Dr. Coddily and I visited LEMSIP on Thursday, July 29. This primate center is located within a mile or two of the NYU lab. Approximately 400 primates are now on hand: rhesus monkeys, baboons and chimps. LEMSIP provides all required services including sample collections, experimental surgery and delivery of the animals to the lab and return if required. In the case of the baboons used by the NYU group, they are housed at LEMSIP and transported to the NYU lab whenever counting is scheduled. Due to an apparently effective system of coordinating research among various scientists, about 170 investigators are currently involved in research with the primates on hand. This involves shaving animals but this is done with full knowledge of all the investigators. The NYU laboratory is in an ideal location to make use of this primate center.

III. Visit with Dr. Roy Albert

Dr. Coddily and I had the opportunity to visit briefly with Drs. Roy Albert and Fred Burns. Most of our discussions were centered around contract No. AT(30-1)-2785, "The Tumorigenic Action of Beta, Proton, Alpha and Electron Radiation on the Rat Skin." Dr. Burns reviewed for us the past history of this research. This included sieve irradiation of skin with beta particles and monoenergetic electrons and later studies with protons and alpha particles. For hair follicle damage and general skin damage, the RBE for alphas compared to monoenergetic electrons was approximately 3 when the depth dose was made equal for both. Resulting tumor morphology showed a connection with the hair follicle; half-damaged follicles were apparently required to produce tumors. Earlier work was with resting follicles; current work centers more on growing follicles. Recent results indicate that a repair process may be available except during the dividing stage. The rat skin makes an interesting system to study the relative effects in quiescent and dividing cells. In the young animal, growth comes in several waves separated by resting phases. In the older animal, growth can be stimulated by plucking the follicle. It appears that this system has some advantages over normal cell culture techniques and will be a valuable research tool.

IV. Visit with Dr. Bernard Pasternack

I discussed progress on contract No. AT(30-1)-4188, "Statistical Analysis of Longitudinal Growth Data on Adolescents Exposed In Utero to the Atomic Bomb, Hiroshima and Nagasaki," with Dr. Pasternack and Mr. Shohoji, the

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graduate student involved in this research. A complete listing of the growth data obtained from ABCU was studied for errors and omissions. It was then returned to ABCC for corrections and additions. This process took several months but is now complete. This enabled 92 additional subjects to be added to the Hiroshima data. The computer program for estimating four parameters associated with the growth curve for each individual, U, L, A and B, is complete. Estimates are now being made for each individual. These will then be grouped to study possible dose-effect relationships. This work appears to be on schedule and headed for completion this contract year.

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