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The New Brookhaven Biology Building and "Gamma Field"

THE completion of the new biology building at Brookhaven National Laboratory allows the extensive use of the research facilities of that laboratory. The organization of the laboratory, which is operated by Associated Universities, Inc. for the Atomic Energy Commission, represents an experiment in the method of conducting basic research in biology. Now well started, it is an attempt to bring university biologists into close association with the newer advances in the physical sciences in order to utilize these ideas and techniques in the solution of basic biological problems. Many of the instruments and techniques involved in work of this kind are very specialized and require extensive facilities or experience to be utilized effectively.

The building itself is a modern laboratory designed to house virtually all phases of biology, and includes extensive animal quarters. All laboratories are equipped to work with radioactive materials, and in addition there is a "hot laboratory" where large quantities of radioactive material can be handled safely. There are two large greenhouses as well as a "radiation" greenhouse in which is located a 7 curie Co^{60} gamma ray source, so plants can be grown under the influence of gamma rays.

In addition, there are a number of special facilities, chief among them being the "gamma field." This is a 10-acre field which currently has a 2200 curie Co^{60} source at its center. Plants are grown at various distances from the source to give various radiation intensities. There is a thermal neutron facility at the reactor where plants and animals can be treated with thermal neutrons, virtually uncontaminated with other radiations, and also a fast neutron facility for similar treatments with fast neutrons uncontaminated with other radiations. There are several high energy accelerators available for biological experiments.

Only a small proportion of the research staff is in residence on a permanent basis, while the rest is at the laboratory for limited periods of time in order to develop an idea requiring special facilities, or to develop special techniques which can later be incorporated in research at a university. Some of these are on leave from universities, some on fellowships, some have no definite university connection but are looking toward a university career, and some are graduate students engaged in their thesis research. The policies with regard to the staff are designed to provide a continuously rotating staff, but with enough permanent members to give the program stability.

The department has been in existence about five years, and the general features of the research program are crystallizing. The chief tool so far used is ionizing radiation, in various forms and in connection with a number of different problems. The first type of study is one of the effects of radiations on biological material, which throws light on normal life processes, especially in plants, whose growth and differentiation can be profoundly altered by radiation. Plants growing in the gamma field may be either badly stunted or stimulated depending on the dosage rate, species, and the characteristic under investigation. Ionizing radiation has proved to be a useful tool in the study of genetic problems including the nature of the mutation process. Addition of fast and slow neutrons to the available radiations is very important, since it is increasingly apparent that neutrons produce biological effects by quite a different mechanism than do electromagnetic radiations.

A cooperative project is being inaugurated between Brookhaven and a number of agricultural experiment stations in which the attempt is being made, on a scale large enough to obtain definitive answers, to produce agriculturally-important mutations by radiation. The material is being irradiated in various ways at Brookhaven and then sent to the experiment stations for screening.

Another extensive activity relating to both plants and animals is the use of radioactive isotopes. Laboratories equipped to work with these in tracer quantities are becoming quite common, so at the present time the unique facilities of the Brookhaven laboratory consist largely of equipment to work with large amounts of material or with isotopes having very short half-lives.

With the completion of the new building the department is now able to house a staff of about a hundred persons, including scientists, students, and technicians. In line with the growing importance of quantitative methods and the newer techniques, the staff includes persons representing many aspects of biology.

H. J. CURTIS

Brookhaven National Laboratory

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