Two of the lakes were held in on one side for a time by the continental ice, in one case for a time long enough to permit building of a large subaqueous moraine.

These lake beds are all 200 feet or more above the Maumee Beach of the proglacial lake in the Erie basin, and are in no way related to that lake. But their tilting carries the continental uplift thirty to forty miles farther south than the Maumee Beach and that much beyond any known tilt of the Great Lakes area.

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SUMMARY STATEMENT OF THE ACTIVITIES OF THE NATIONAL RESEARCH COUNCIL, 1937–1938

II

DENSITY CURRENTS

With the large number of power and storage reservoirs which have been constructed throughout the country in recent years a new problem of hydrodynamics has come to be recognized in the frequent occurrence in these reservoirs of streams or layers of water of a density or turbidity different from that of the surrounding body. The density of incoming waters varies with the salt content, with the temperature and with the burden of fine silt held in suspension. Currents of incoming water may move through a reservoir from entrance to exit without losing their identity by mixture with surrounding water. At other times turbulence causes a general or partial mixing. The problem consists of ascertaining the conditions which may cause or impede the general mixing of waters. It relates not only to waters in reservoirs and lakes but also to water at the confluence of rivers and to the meeting of fresh water with tide water. Among the practical applications of the problem are the determination of the quality of the waters impounded and likely to be delivered to the communities served by irrigation or urban water supply systems and estimates of the rate of filling of these reservoirs by the deposition of silt. An interdivisional committee has been appointed under the auspices of the Division of Geology and Geography to coordinate field observations which have been undertaken by several government agencies, including measurements in a number of reservoirs and natural lakes, such as Lake Mead on the Colorado River, Elephant Butte Reservoir in New Mexico, and several storage lakes in the Tennessee Valley.

RESEARCH IN PROBLEMS OF SEX

The Committee for Research in Problems of Sex has been enabled to continue its work for a period now of over sixteen years, supported by funds provided in the earlier years by Mr. John D. Rockefeller, Jr., and later by the Rockefeller Foundation. There seems to be no doubt that a large part of the advancement of knowledge that has been achieved in this field in the United States is due directly to the continued financial support with which the committee has been provided for this purpose and to the stimulating effect upon these researches which integration of interest within this field has effected. At the beginning of the committee's work, in 1922, the subject of the sex hormones was presented for special support because but little was then known concerning hormones in general or the sex hormones in particular. This subject later became a major part of the committee's program. With the large expansion of the field of endocrinology, however, the committee has turned its resources to the neuro-physiological and psychobiological problems of sex under the policy of applying its resources to the less well-developed aspects of the general subject rather than to those in which strong momentum has been acquired. Moreover, the support of a number of investigations initiated by the committee has been taken over by other agencies, giving the committee latitude for the development of new projects. The committee is able to give support to the work of fifteen or twenty collaborators annually, who are located at strong centers about the country for physiological and psychological research.

ENDOCRINOLOGY

A program similar to that for research in problems of sex was set up last year for research in the general field of endocrinology, with attention to the more general metabolic processes, and the relationships of endocrine secretions to aging and to tumorous growths and other hormonal influences. The program is carried on with the cooperation of over twenty-five collaborators in various institutions. It was selected for support by the John and Mary R. Markle Foundation, after careful study of many opportunities, as one of the most useful fields of science to which the Foundation might give aid.

NARCOTICS RESEARCH

The Committee on Drug Addiction, which is concerned with investigations upon the chemistry and

pharmacology of narcotic drugs, supported by the Rockefeller Foundation, has prepared a résumé of its work during the past seven years. The committee has an interesting record of exploration into an unknown field, involving the setting up of research establishments competent to deal with the several aspects of the total problem; the contribution of much new knowledge upon the chemistry and pharmacology of narcotic alkaloids; the development of a large number of new alkaloid substances and the determination of their properties; the testing of the clinical characteristics of certain of the more promising of these substances; the devising of channels for the control of these products in the United States and abroad by taking advantage, under new relationships, of the existing patent laws and other facilities; and effecting the cooperation of a large number of individual scientists and physicians and of different types of agencies, educational, industrial and governmental. The report upon the work of this committee will be published this winter as Supplement 138, of the Public Health Reports.

Radiation Research

The program for the study of the biological effects of various types of physical radiation, which the Council has sponsored for the past eight years, is to be continued during the current year. These investigations have been supported by funds provided by the Rockefeller Foundation and by the loan or donation of apparatus and materials by manufacturing concerns. Some twenty-seven investigators are now collaborating in this program, located at twenty-four institutions.

In the early years of this project the grants assigned were in the fields of cytology, genetics and growth and development. In more recent years emphasis in the program has been placed upon quantitative studies and on the mechanism of the effects of radiation. Due to the generous provision of apparatus and materials by manufacturers, it has not been necessary for the Council's Committee on Radiation to allot more than a small proportion of its grants in any one year for the development of apparatus.

Among the problems in this field the mechanism of photosynthesis is perhaps attracting the greatest attention. Other problems on the horizon relate to the influence of radiation as a factor of association upon the hormones of green plants, to the photochemical effects of polarized light, the effects of simultaneous or successive exposure to different wave-lengths of light, and the use of radioactive salts as tracer substances in studies of metabolism. In the development of apparatus the availability of high electric voltages and of fast neutrons are important contributions for biological experimentation.

Aerobiology

During the past year the Council's Division of Biology and Agriculture has aided in the development of studies of aerobiology, directed particularly to the occurrence in the upper air of microorganisms, bacteria, viruses, pollen, plant spores and other organic as well as inorganic dusts, and the transportation of these minute particles with air movements. The subject relates not only to the distribution of human, plant and animal diseases, such as the hay fevers and certain wide-spread infections of field crops, but also to the spread of the fungi of industry, both useful and harmful varieties, to problems of economic entomology and of plant breeding and various aspects of plant and animal dispersion. Not of least importance among the applications of knowledge of the biology of the upper air is the utilization of air-borne substance as indicators of air movements.

The project was particularly the creation of Mr. Fred C. Meier, of the U. S. Department of Agriculture. The convincing unfolding of the possibilities for valuable investigations in this newly recognized field, made accessible only comparatively recently by the airplane, was due to Mr. Meier's penetrating vision and courageous enthusiasm. The work commanded the strong interest of the Carnegie Corporation of New York and of the Department of Agriculture, both of which engaged jointly in support of an exploratory program. It is with the deepest regret that record is made of the untimely death of Mr. Meier, and of his colleague in these studies, Dean E. B. McKinley, of the George Washington University Medical School, with the unfortunate loss of the Hawaii Clipper between Guam and Manila on July 29 last, on a journey undertaken in the interests of this project. The loss of these leaders is a heavy sacrifice to science and a very great set-back to the development of a program of research upon this important subject.

Journal of Psychosomatic Medicine

Among the subjects for research emerging from the series of conferences which were held last year upon borderland problems in the life sciences were the cause of neuroses in human beings and the influence of these disturbances on behavior of the individual and of groups. A favorable approach to this field of research seems to lie through the study of experimentally produced neuroses in animals, and a committee has been appointed by the Council to develop and coordinate investigation in this field. A number of groups of problems of human neuroses can be recognized, re-

lating to the neuropathological effects of drugs, to the influence of hormones and hormonal sex factors, to early trends of personality in children, frustration studies and conclusions to be derived from psychoanalysis.

In order to provide an outlet for contributions in the field of experimental psychology dealing with neuroses and psychiatry, this committee is establishing a quarterly journal to be called *Psychosomatic Medicine,* the first issue of which is scheduled to appear in January, 1939. The journal is to be supported in its initial stages by a grant from the Josiah Macy, Jr. Foundation. It is the purpose of the journal "to bring together studies which will contribute to the understanding of the organism as a whole in both somatic and psychological aspects." The journal will be in charge of an editorial board representing psychology (in general), neurology, psychiatry, psychoanalysis, comparative physiology, internal medicine and pediatrics, and its scope will comprise these and related fields.

International Scientific Congresses

The National Research Council appointed representatives for the following international scientific congresses this year:

XIIIth Conference of the International Union of Chemistry, and the Xth International Congress of Pure and Applied Chemistry, Rome, May 15–21, 1938; 15 representatives.

XVth International Geographical Congress, and the 6th General Assembly of the International Geographical Union, Amsterdam, July 18–28, 1938; 7 representatives.

VIth General Assembly of the International Astronomical Union, Stockholm, August 3–10, 1938; 6 representatives.

VIth General Assembly of the International Scientific Radio Union, Venice, September 5–25, 1938; 5 representatives.

In addition a considerable number of other American scientists attended these meetings.

Publications

Among publications of the Council during the year may be mentioned:

An "International Directory of Anthropologists," which lists about 1,950 names, of whom some 600 are from the United States (mimeographed).

A treatise upon "Measurement of Radiant Energy" and a "Glossary of Physical Terms," sponsored by the Council and published commercially by the authors in the latter part of 1937.

"An Experimental Study of the Problem of Mitogenetic Radiation," issued under auspices of the Committee on Radiation. (N.R.C. *Bulletin* No. 100; July, 1937.)

The preparation of the third edition of the "Handbook of Scientific and Technical Societies of the United States and Canada," the Canadian section having been compiled by the Canadian National Research Council. (N.R.C. *Bulletin* No. 101; October, 1937.)

The "Third Report of the Committee on Photochemistry," critically summarizing contributions in this field during the seven years since the issuing of the Second Report of this Committee. (Published in the *Journal of Physical Chemistry,* Vol. 42, pages 699–854, June, 1938; and in the N.R.C. *Reprint and Circular Series,* No. 108, July, 1938).

Ross G. Harrison,
Chairman
Albert L. Barrows,
Executive Secretary

SPECIAL ARTICLES

ANTI-CATALASE AND THE MECHANISM OF SULFANILAMIDE ACTION

Healthy, normal rabbits fed sulfanilamide in adequate dosage survive intradermal infection with type I pneumococcus in greater number than rabbits not so benefited.[1] Blood taken from the rabbit during the period of conferred increase in capacity for resistance has a comparably increased capacity for retarding proliferation of type I pneumococcus *in vitro*.[2] The increase is, possibly, accomplished in an indirect way: the actual checking agent being, not sulfanilamide itself, but hydrogen peroxide.

[1] A. Locke, R. B. Locke, R. J. Bragdon and R. R. Mellon, SCIENCE, 86: 228, 1937.

[2] A. Locke, E. R. Main and R. R. Mellon, *in preparation.*

The pneumococcus and the hemolytic streptococcus have the property of being able to produce peroxide without, at the same time, being able to prevent peroxide accumulation.[3] Both are sensitive to peroxide injury and depend for peroxide elimination on catalase borrowed from the medium supporting growth. Catalases decompose peroxide and permit growth so long as they remain efficient. They are inactivated by hydroxylamine[4] and by substances related to hydroxylamine in structure or properties.[5,6]

[3] J. W. McLeod and J. Gordon, *Jour. Path. Bact.,* 26: 326, 1923.

[4] H. Blaschko, *Biochem. Jour.,* 29: 2302, 1935.

[5] D. Keilin and E. F. Hartree, *Nature,* 134: 933, 1934.

[6] M. G. Sevag and L. Maiweg, *Biochem. Ztschr.,* 288: 41, 1936.