If we accept for the moment these mechanisms of controlling metabolism and growth, which we shall consider normal, the further step of evolving a cancer theory is obvious. We have proposed that cancer is due to an abnormal protein which is similar to a normal aerobic enzyme protein except that it lacks the catalytic power of the normal enzyme. This abnormal protein could occur accidentally as a result of poor heredity, or it could be produced experimentally by the action of carcinogenic agents on the normal enzymes. Cocarcinogenic agents, injuries and irritations could act by breaking down ATP. Ordinarily this process would simply stimulate the control mechanisms, repair would take place, and the process would stop. However, in the presence of the cancer protein, the process would be sidetracked and there would be no way for the normal cessation of growth to occur.

The nature of the calorie effect and the exercise effect involves the metabolic response which is mediated by the pharmacologic control. It appears to be due to the increased efficiency of the trained animal in working at a lower concentration of fuel and building blocks than can be tolerated by the cancer. In other words, the trained organism can compete with the cancer during the critical period. In the absence of exercise and in a flood of nutrient there is no competition and the cancer thrives. Eventually the cancer passes the critical point and is able to damage the surrounding tissue (possibly by acid) and thereby provide itself with a border of normal cells which behave as if they were treated with a cocarcinogen. The cancer then grows until the host is killed.

In conclusion I wish to re-emphasize that the cancer problem is susceptible to experimental study and that the nature of cancer now seems fairly clear. Animal experiments provide us with a definite guide toward the prevention of cancer in humans. The answer may consist in eating no more than we need and in keeping physically fit, with the addition of proper medical care so that any chronic irritations are eliminated. These precautions demand a considerable degree of self-discipline, but I am confident that as soon as the points are thoroughly established, educational campaigns can get the message across to the people. It is here merely suggested that nutritionists, dietitians, physicians and the public remain as alert to scientific developments regarding the effect of diet restriction and the effect of exercise upon nutritional requirements as they are to developments in dietary adjuvants. The restriction of the quantity of food eaten requires that the quality of the food be carefully controlled. The metabolic studies have other implications, which involve the frequency of food ingestion. The practice of feeding workers six times per day may be sound psychology, but it does not increase the efficiency of their metabolism.[9] It is now clear[10] that the human body adapts itself to various difficult situations by improving its metabolic efficiency. Since maximal metabolic efficiency appears to be related to decreased degenerative disease, the human race is confronted with a nice problem as to how to improve our external environment without weakening our internal environment. We believe that the future of mankind rests on the physical and psychological results inherent in the solution of this problem.

OBITUARY

RECENT DEATHS

DR. ROBERT TUTTLE MORRIS, professor emeritus of surgery of the Post-Graduate Medical School of Columbia University, died on January 9 in his eighty-seventh year.

DR. OSCAR V. BRUMLEY, since 1929 dean of the College of Veterinary Medicine of the Ohio State University, died on January 13 in his sixty-eighth year.

DAVID LUMSDEN, since 1922 and until his retirement in 1941 horticulturist of the Bureau of Entomology and Plant Industry of the U. S. Department of Agriculture, died on January 22 in his seventy-fourth year.

DR. WILLIAM T. ROOT, since 1935 dean of the Graduate School of the University of Pittsburgh, previously head of the department of educational psychology, died on January 24. He was sixty-two years old.

DR. LYDIARD H. W. HORTON, consulting psychologist, Boston, and lecturer on biopsychology at the School of Medicine of Boston University, died on January 19 at the age of sixty-five years.

WILLIAM T. DAVIS, entomologist, president of the Staten Island Institute of Arts and Sciences until his retirement with the title emeritus in 1934, died on January 22 at the age of eighty-two years.

HARRY PHILLIPS TREVITHICK, chief chemist of the New York Produce Exchange, died on January 17 in his fifty-ninth year.

DR. HENRY GREENWOOD BUGBEE, urologist of New York City, died on January 18 in his sixty-fourth year.

PROFESSOR PIERRE ALLORGE, specialist in mosses

[9] See "Symposium on Physiological Fitness," *Fed. Proc.*, 2: 164, 1943.

[10] *Ibid.*, pp. 144, 158.

and algae, a member of the staff of the Laboratoire de Cryptogamie of the Museum d'Histoire Naturelle, Paris, in 1937 president of the Société botanique de France, died on January 21.

VLADIMIR IVANOVICH VERNADSKY, professor of crystallography and mineralogy at the University of Moscow, died on January 6 at the age of eighty-two years.

SCIENTIFIC EVENTS

THE TYPHUS COMMISSION OF THE UNITED STATES OF AMERICA

BRIGADIER GENERAL S. BAYNE-JONES, U.S.A., deputy chief of the Preventive Medicine Service of the Office of the Surgeon General, U. S. Army, and director of the U. S. A. Typhus Commission, has made the following statement:

In the President's Executive Order No. 9285 dated December 24, 1942, establishing the United States of America Typhus Commission, provision is made for research on typhus fever and for collaboration with all appropriate agencies. Ever since the commission went into action in January, 1943, research on typhus fever and the related rickettsial diseases has been one of the main objectives. This research has been conducted in this country and overseas by Typhus Commission personnel, and by investigators in the laboratories of the Army Medical School, the Army Medical Museum, the National Institute of Health, the U. S. Public Health Service and the Naval Medical Research Institute. Furthermore, there has been full collaboration with numerous civilian institutions both in this country and abroad. The work has advanced the understanding of typhus, has improved control measures of both epidemic typhus and scrub typhus and may be leading to the discovery of effective remedies for several types of typhus fever. There are many unsolved problems, but definite progress is being made. The point which I wish to emphasize is that the operation of the U. S. A. Typhus Commission again exemplifies collaboration and coordination of activities of both military and civilian agencies and the drawing to the support of a research program great resources and competent investigators from both military and civilian establishments.

THE WAR AND ENGINEERING EDUCATION

To conserve certain advantages the war has brought, the Carnegie Foundation is conducting a study of measurement and guidance in engineering education at eleven cooperating higher institutions. The undertaking is sponsored jointly by the Engineers' Council for Professional Development, the Society for the Promotion of Engineering Education and the Carnegie Foundation, funds being provided by the two engineering bodies and the Carnegie Corporation of New York.

Based on an inventory of the ability and skills which the entering student of engineering is expected to possess, seven special tests are used to appraise his ability and to assist in assigning and guiding him in his training and choice of career.

Among engineers and educators associated with the work are Robert E. Doherty, B. R. Teare and J. B. Rosenbach, of the Carnegie Institute of Technology; Everett S. Lee and A. R. Stevenson, of the General Electric Company; Alan R. Cullimore and A. D. Moore, of the Newark College of Engineering; R. L. Sackett, of the American Society of Mechanical Engineers; R. H. Frazier and T. P. Pitre, of the Massachusetts Institute of Technology; H. S. Rogers, of the Polytechnic Institute of Brooklyn; Francis M. Dawson and John M. Russ, of the State University of Iowa; T. W. Wood, of Northwestern University, and Carl J. Eckhardt, Jr., of the University of Texas.

ADDITIONAL GRANTS OF THE SUGAR RESEARCH FOUNDATION

FUTURE uses for sugar and new evidence to establish the functions of sugar in the human diet are the object of research now being conducted by college and university investigators under grants-in-aid from the Sugar Research Foundation of New York City.

Founded under the laws of the State of New York on June 10, 1943, the Sugar Research Foundation, of which Joseph F. Abbott is director, is an organization of growers and processors of cane and beet sugar in the continental United States, Hawaii, Puerto Rico, Cuba and Canada. Ody H. Lamborn is the executive director. Dr. Robert C. Hockett, who has leave of absence for five years from the Massachusetts Institute of Technology, where he is associate professor of organic chemistry, is the scientific director.

The purpose of the foundation is to collect and discover facts about sugar—its physiological functions, its chemical characteristics—and to develop its many potential uses.

The first of the grants-in-aid was made to the Massachusetts Institute of Technology, where, in December, 1943, the Sugar Research Foundation Laboratories, a training center for carbohydrate chemists, were established. Here pure and applied organic chemical research on sugars is in progress. This is a five-year project for which the amount appropriated was $125,000.

In addition to the individual grants listed in SCIENCE for January 12 the following grants are reported:

Professor Ancel Keys, laboratory of physiological hygiene, University of Minnesota, for studies of the human requirement for B vitamins.