

THE KETTERING LABORATORY OF APPLIED PHYSIOLOGY

To the President of the University:

Sir,- The Kettering Laboratory of Applied Physiology in the Physiology Department of the University is devoted primarily to the investigation of those hazards to the health of certain groups of persons or of the general population which arise out of the activities and materials of modern industry. It was founded in 1930, as an outgrowth of experimental work on lead absorption and lead poisoning which had been carried on in the Department of Physiology since 1925. The Laboratory Building and its fixed equipment were made possible by a gift of \$130,000 made to the University jointly by the Ethyl Gasoline Corporation, E.I. duPont de Nemours and Company and General Motors Corporation through its Frigidaire Corporation. The entire budget of the Laboratory is made up annually by funds supplied to the University by industrial organizations whose problems in occupational or public hygiene are accepted as suitable for investigation in a university. Up to the present time, the major portion of the budget has come from the Ethyl Gasoline Corporation in support of an extensive investigation of the occurrence and the activities of lead compounds with relation to public and industrial health. Additional financial support was provided for a time by the Frigidaire Corporation to defray the expense of certain studies of the occupational and public health aspects of the manufacture and use of various materials as refrigerants.

Still other funds have been derived, from time to time, from E.I. duPont de Nemours and Company, and certain of its subsidiaries, to cover the cost of the investigation of the toxicologic properties of materials variously employed as refrigerants and organic solvents.

The Laboratory staff consists of ten workers with general or special training and experience in investigation, and eight technical assistants of various types.

The productive efforts of the Laboratory, in terms of its published work, have been greatest during the years covered by this report (the academic years 1932-33 and 1933-34), partly because the members of the staff, individually and as a group, have developed an increased effectiveness, but more for the reason that certain phases of the experimental program have reached a stage wherein the results of several years' work have come to fruition. By reason of this organic continuity of investigative work it is impossible to define sharply the accomplishments of a two-years' period. In order to be realistic therefore, and to avoid reckoning with futures, however promising, it seems best to deal only with work actually done without taking into account that which is planned or in progress.

The investigation of lead and its activities has resulted in establishing certain facts which have a profound bearing upon methods and points of view in industrial medicine and hygiene. The magnitude of human lead absorption and lead excretion under certain primitive (natural) conditions, under the conditions which prevail generally among the population of the United States and under occupational

conditions in certain lead trades, has been put upon a sound quantitative basis. The effects of this basic information are three-fold: it furnishes a practical and useful estimate of the gross influence of present-day methods in handling, processing and distributing food materials upon the level of human lead absorption and excretion outside the lead trades, and thereby provides a basis for the recognition of future alterations in the American environment with respect to lead exposure; it sets up accurate and reproducible standards for the differentiation of "normal" persons from abnormal, with respect to lead intake, absorption and excretion, thereby giving material aid in the diagnosis of lead intoxication; it establishes a tentative but immediately useful criterion for the definition of dangerous occupational conditions as to lead exposure, and so develops into a means for the prevention of industrial lead poisoning.

As a part of the lead studies, the hygienic significance of the distribution and use of gasoline containing tetraethyl lead as a motor fuel has been under investigation. In fact, the necessity of setting up standards for the interpretation of this problem in public and occupational health has been an important factor in determining the scope of the entire study. At present, this Laboratory is the only source of new information on this subject, and its conclusions have a wide influence in this country and abroad in shaping the point of view and the activities, with respect to this question, of those who are responsible for industrial and public hygiene. During the past two years the occupations chiefly concerned in this matter have been re-investigated by new methods and with

a precision and care commensurate with the responsibility of the Laboratory. The data are being assembled and analyzed now, and will be published at an early date.

Other work of the Laboratory has been concerned with the study of the toxicologic activity of various organic and inorganic fluorine compounds. Within the past two years this has led to the investigation of the effects of certain irritating acid gases of which hydrofluoric acid is the only one completely studied at this time. That portion of this work which has been published is a significant contribution to a knowledge of the behavior of fluorine in the animal organism. A method has been developed for the determination of fluorine in organic material, which has been accepted as a distinct improvement over previous methods.

Respectfully submitted,

Robert A. Kehoe,

Director of the Kettering Laboratory
of Applied Physiology.