

Memorandum

On the Development of the Kettering Laboratory
of Applied Physiology in the College of Medicine
of the University of Cincinnati.

Near the end of the school year in the spring of 1924

Professor Martin H. Fischer and Assistant Professor Robert A.

Kehoe of the Physiology Department of the College of Medicine of
the University of Cincinnati had a consultation with officials of
the General Motors Chemical Company of Dayton, Ohio concerning a
type of poisoning that had developed among workmen engaged in the
preparation of a product containing tetraethyl lead, a newly
discovered and toxicologically unexplored anti-detonating agent for
use in the fuel of internal combustion engines. It was agreed
that Dr. Kehoe, who had been studying heavy metal poisoning, should
spend the summer caring for the sick men ^(maintaining medical supervision over exposed workmen) and investigating the hygienic
problem in the plant of the General Motors Chemical Company. During
that summer, and throughout the next academic year, (on a part-time
basis arranged with the consent of the Professor of Physiology so
as not to conflict with regular teaching duties), Dr. Kehoe worked
in a small laboratory of General Motors Research Corporation, studying
the nature of the intoxication induced by tetraethyl lead and inves-

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tigating means for the control of dangers arising in its manufacture and use. By the time information had been obtained to make possible the safe manufacture of the product, it became apparent that certain potential dangers to the distributors and handlers of gasoline and to the public were of considerably more significance, in relation to the continued operation of the industry, than were the hazards of manufacture. Accordingly it was considered necessary to begin certain investigations into the public health aspects of the matter. ^{by Gen. Mot. Chem. Co.} ~~(Certain phases of this problem had been submitted to the U.S. Bureau of Mines for experimental investigation in Pittsburgh for investigation as early as October of 1923)~~ While

these were getting under way, a new alignment of the industry was accomplished in that the Ethyl Gasoline Corporation was organized out of General Motors Chemical Company through a partnership arrangement between General Motors and the Standard Oil Company of New Jersey. Shortly after this (May 1925) a series of acute and fatal poisonings occurred in an experimental plant in which the technical staff of Standard Oil Company of New Jersey, working independently and without benefit of the available information on the toxicity and physiologic effects of tetraethyl lead, had developed a new process for its manufacture. The effect of these tragic and somewhat luridly publicised events was to arouse the outspoken fears of a number of hygienists and public health workers, who in the main believed that

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the dangers of the use of gasoline containing tetraethyl lead were similar in type and magnitude to those associated with the manufacture of tetraethyl lead. In response to these fears a general conference of interested persons was called by the Surgeon General of the United States Public Health Service on May 20, 1925, to consider experimental data made available by several groups of experimental workers, to discuss the problems at issue, and to decide upon a course of action if required. (See Public Health Bulletin No. 158). After considering the available information it was agreed as being the sense of the conference that the Public Health Service should undertake an investigation of the hazards to the health of the public ^(at public expense) and report with recommendations at a later conference to be called on completion of the work. At the original conference the work of Dr. Kehoe and his associates, on the public health aspects of the problem were presented in detail and one phase of it, namely, the clinical and laboratory studies on men engaged in the handling and use of leaded gasoline was the chief controversial point in the discussion. Similar studies ^{by more or less corresponding methods but} were undertaken, on a larger scale, by the Public Health Service, ~~and~~ ~~by generally corresponding methods~~, these studies constituting the essential basis of ^{of} the final report. (See Public Health Bulletin No. 163)

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That the results and conclusions of the Public Health Service presented in January of 1926 were in agreement with those reached by Dr. Kehoe and his associates is mentioned here only because this complete agreement demonstrated the disinterested character of the work done by Dr. Kehoe and established a basis for the professional respect and cooperation between him and the Public Health Service which now exists.

While the investigation of the Public Health Service was in progress, other experimental work begun by Dr. Kehoe was continued in the belief that the investigation would vindicate his position, based upon his work and that of the U.S. Bureau of Mines and accepted by the industry, that there was no evidence pointing to the existence of danger to the public health from the use and distribution of leaded gasoline. It had now become apparent that the work on this problem was of a public nature and in the public interest, and it was recommended by Dr. Kehoe, and sanctioned by the administrative authorities of the University of Cincinnati, that it should be brought under the sponsorship of the University of Cincinnati. Accordingly in the autumn of 1926, the experimental work in the

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and certain items of equipment and certain of the assistants who
wished to continue in the work
~~selected to do so~~ were transferred to the physiological laboratories
in the College of Medicine of the University of Cincinnati. There
was now a complete physical and administrative separation of the
technical developmental work of the Ethyl Gasoline Corporation from
the experimental work along toxicologic and hygienic lines, since
meanwhile the Corporation had developed extensive industrial research
laboratories in Yonkers, New York. This separation, however, did
not occur as a matter of chance. On the contrary, Dr. Kehoe had
rejected a proposal that a laboratory and experimental facilities
be provided for him in conjunction with the technical research
laboratories of the industry, and that he assume a full-time position
as director of medical work and toxicologic research for Ethyl Gasoline
Corporation. This was rejected because it involved the termination
of long standing ~~University~~ ^{medical} associations and obligations and because
moreover it would have meant the removal of the experimental work from
a ~~medical~~ ^{medical} center of teaching and research in which alone, in Dr. Kehoe's
belief, it could be expected to develop along proper channels.

Through the balance of 1926, and up to 1930, experimental
work on the general nature of lead poisoning, and on the type and source

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of lead exposure in the American community, was carried out by a small staff of workers under the direction of Dr. Kehoe, in the Eichberg Laboratory of Physiology (Martin H. Fischer, Professor and Head of Department). By the end of 1929 the work had grown in scope and had attracted sufficient attention that other industries ^{sought to bring} had ~~brought~~ hygienic problems to it for solution. It became apparent ^{the development of facilities for general industrial toxicologic investigation.} that the time had come for ~~expansion of the work~~. A conference between Dr. Fischer, Dr. Kehoe and the representatives of Ethyl Gasoline Corporation, General Motors Corporation and E. I. duPont de Nemours and Company resulted in a program for the establishment of a new and adequately equipped laboratory. This program, when ~~developed~~ developed, brought into being the Kettering Laboratory of Applied Physiology. A contract between the University and the donors of the laboratory stated that the gift of funds for building and equipping the laboratory was without condition, except that the University agreed to complete the building within the funds allotted. The University for its part reserved the right, which had never been questioned, of planning and conducting the experimental work and of publishing the results through the customary scientific channels for the public good.

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All funds for the support of the experimental work whether provided by the industries initially represented or by others, were to be given to the University and administered by the University authorities in accordance with their general policies ^{as} ~~with respect~~ to compensation of personnel and the expense of operation. Any financial support ^{provided} for an experimental program ^{by an industrial organization} ~~on the part of an industry~~ was on a definite time basis and involved no commitments beyond that time.

It should be stated ^{for the sake} ~~in the interest~~ of accuracy that a proper formal relationship of administrative officials of the University to the experimental program financed by Ethyl Gasoline Corporation began with the formulation of the agreement mentioned above. Prior to that time, certain members of the staff working in the Eichberg Laboratory of Physiology, some of whom had been members of the group working with Dr. Kehoe in the General Motors Research laboratory, had been directly compensated by Ethyl Gasoline Corporation, partly because of the financial advantages of the arrangement to them and partly for reasons of convenience. There was no question of professional impropriety, but only of administrative form, since the investigative work was carried out and reported in full accordance

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associates with the knowledge and consent of the Professor of Physiology. Nevertheless when the facts with respect to the financial arrangement came to the direct attention of the President and the Business Manager of the University, they required that all workers in the laboratory become regularly appointed and compensated members of the University staff, and that all funds be administered wholly by the Business Manager of the University on the instructions of its Board of Directors. This policy was put into effect in 1930 at some considerable financial sacrifice on the part of certain staff members, but with complete and actually enthusiastic acceptance of its justice and propriety. Since that time all funds accepted from industry in support of experimental projects have been approved by the Board of Directors after examination of the facts and after agreements expressly protecting the rights and responsibilities of the University. Moreover all further additions to the staff of the Laboratory have been made without any concern or knowledge on the part of the persons involved as to the source of financial support of the Laboratory. All the members of the staff have shared in the disadvantages associated with the generally low salary scale and the somewhat uncertain economic status of the University, and in certain advantages such as professional

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associations and reasonable security in ~~tenure~~ of occupation that accrue to members of a ^{university} University faculty, as well as the advantage of freedom from federal income taxes as employees of a municipal University. The latter, of course, was one of the financial inducements offered to prospective members of the technical staff, ^{lieu} in ~~lieu~~ of higher initial compensation and larger opportunities for financial advancement. It must also be recognized that the "reasonable security" referred to above ~~was~~ somewhat more tenuous in the case of the staff of this laboratory by virtue of the year to year character of its financial arrangements. Actually there ~~was~~ somewhat greater security than is implied in this statement since the prestige of the laboratory has grown with the years and opportunities for its expansion in both scope of work and in financial support have been offered on a larger scale than it has seemed wise to accept. Thus ~~to a very large degree~~ the laboratory has interested itself chiefly and almost exclusively in fundamental problems of general medical and hygienic interest, the investigation of which might be expected to extend over considerable periods of time and to involve a maintained or perhaps an increasing interest on the part of ^{Contributors} ~~financial sponsor~~. In this connection it should be

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pointed out that as the chief medical and hygienic consultant of Ethyl Gasoline Corporation (in a private professional capacity) Dr. Kehoe ^{has been} ~~was~~ in position to know that the public health problem involved in the distribution and use of gasoline containing tetra-ethyl lead could be solved, in a final sense, only through the most intensive and extensive study of the general magnitude and the sources of human lead absorption, as well as the physiological mechanisms involved in lead absorption and in the production of lead intoxication. This phase of the work of the laboratory ~~has~~ ^{has} thus ^{been} assured of financial support ~~for~~ ^{over} a considerable period of time; and it might be assumed, if the productivity and quality of the experimental work bore any proper relation to the importance and magnitude of the problem, that it would never lack sponsorship from other industrial organizations. The validity of this assumption can best be demonstrated by referring briefly to the published work of the laboratory since 1930, and by calling attention to the growth of the laboratory in terms of the increase in staff members, in gross annual expenditures and in the number and size of contributions to the financial support.

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Memo not completed because the matter settled.