

The Kettering Laboratory of Applied Physiology, in its present form, was founded in 1930, a gift of \$130,000.00 having been made about a year before to the University by the Ethyl Gasoline Corporation, the Frigidaire Division of the General Motors Corporation, and E. I. duPont de Nemours and Company, as a joint contribution. Actually, work on the toxicity and behavior of various chemical compounds projected for use in industry and for general distribution, had been carried out by myself and a few associates in the Department of Physiology since 1925. This work had assumed such proportions as to require greatly increased facilities in space and equipment. When the industrial groups who had interested themselves in it were informed of this situation, they agreed to provide the funds necessary to provide a building and equipment, which would be adequate for immediate needs and for an anticipated expansion of the work.

In view of the practical, as well as the scientific importance of the problems under study, it was understood that these corporations would provide funds for the maintenance of the investigative work, but it was agreed that they were under no obligation to do so, and would discontinue their contributions at any time they should choose to do so. Such contribution as they might make, however, in the form of building and equipment, or for the purchase of further equipment and supplies, was to become, outright, the property of the University of Cincinnati, without any quid pro quo except to the extent that the work of the laboratory, planned

and carried out by the staff of the laboratory (i.e. the University), and published through the usual scientific channels, might be regarded as a useful product worthy of further development. (The problems involved being of considerable significance in relation to public as well as industrial health, productive investigation would, of course, be useful and valuable in the formulation of the operating programs and policies of these corporations.) It was also believed that other industrial organizations would bring some of their problems and troubles to the laboratory, and that the development of a judicious policy with respect to the nature of the work accepted and the methods of handling such work, would result in adequate and perhaps expanding financial support. This belief has been justified in that some twenty-odd industrial groups have made significant contributions to the support of the laboratory, and its annual budget has steadily increased, from \$32,000.00 in 1930 to \$105,000.00 in 1940. Meanwhile a careful choice of experimental projects has been made, on the primary basis of the medical or hygienic significance of the problems presented, and secondarily, of course, in accordance with the more or less specialized interests and skill of the laboratory staff.

The budget is made up annually after conference of the Director (of the Laboratory) with contributors to the budget of the previous year, or with any additional groups or persons who are interested in the work. The general nature of the work on long-time projects has been planned in advance, and the probable cost has been estimated, somewhat on the high side. Any new projects are submitted to the Board of Directors of the University for approval or rejection, with a complete statement of the potentialities of the

work, scientifically, hygienically and financially, in so far as these potentialities can be foreseen. Additions to the staff are made cautiously in relation to any new project or the expansion of old ones, and are believed to be justified only if a reasonable assurance of continued and adequate compensation can be given the candidate for a position.

The major function of the laboratory is the study of occupational diseases and intoxications, with particular emphasis on the toxicity and mode of action of materials handled or manufactured by industrial workers, or distributed for use in the community. This phase of applied physiology is developed, where feasible, into a study of ^{physiological} mechanisms of a general type. As one example, we are systematically working on certain phases of the mineral metabolism, since for practical purposes we cannot hope to understand the nature of heavy metal poisoning without such information, but also because, in our opinion, there is no more interesting physiological problem than the role of minerals in the animal organism. Our work also embraces field studies of environmental conditions and groups of people, so as to render hygienic service to industry, and the community at large, as well as to correlate experimental and clinical data.

In an administrative sense, the Laboratory is, in effect, an independent department of the Medical School. It is, however, a branch or sub-department of the Physiology Department, its autonomy being a matter of agreement between the Dean of the Medical College, the Head of the Physiology Department, and the Director of the Laboratory. For several years, I and certain of my associates gave one unit of the laboratory course in Medical

physiology, using the space and equipment of the Laboratory for that purpose. This was discontinued for reasons unrelated to organization, and may be resumed at any time, thereby turning any and all of our facilities into the teaching of physiology. We take occasional graduate students. One man took his Ph.D. in Physiology last year. We collaborate with other colleagues in the Medical School as does any other Department, but on a purely voluntary basis.

In our field of medical work, we are regarded as specialists, in a sense, and consequently the physicians on our staff see (but are not responsible for the care of) patients in the General Hospital, and the laboratory staff carry out special diagnostic procedures for which we are specially equipped. These are done, needless to say, without cost to the Hospital or to the City of Cincinnati. We cannot avoid seeing patients at other hospitals, nor can we altogether neglect the performance of diagnostic work for which there are no other local facilities. We limit these, so far as possible, to such as will be in keeping with our experimental interests, but we cannot wholly ignore special calls upon our professional services. For example, I see or am consulted about most of the cases of lead poisoning in this section of the country, and unhappily, many at distances considerably removed from Cincinnati.

The members of the staff of the Laboratory are appointed by the usual mechanisms of the University, and most of them for full-time service. Two physicians who have other professional responsibilities are on part-time, as are two medical students. All are salaried research workers, with formal rank in the University. There are no fellowships available in the Laboratory since we accept no work of any kind for which the Director and the staff do not take full professional and scientific responsibility,

and since we engage only in medical and hygienic investigations, all the work is under the direct supervision of medical men. Our organization, therefore, has no resemblance to that of the Mellon Institute.

Candor compels me to say that the Laboratory was founded in this Medical School because the work out of which the Laboratory grew was brought to me in the first instance, and since I had no intention of severing my connections with the College, it remained here. I became interested in the problem of heavy metal poisoning as a student, and continued my interest as Assistant Professor of Physiology from 1921 on, and when the predecessor of the Ethyl Gasoline Corporation, then in Dayton, Ohio, found itself in difficulties it came to me, partly as physician and partly as investigator, to help it out. I have never considered the possibility of medical investigation except in a University Medical School, partly by reason of my deliberate choice of medical teaching and research as a profession, and partly because, in my opinion, the kind of work I and my associates are doing must be done in a publicly responsible institution which maintains complete freedom from even the suspicion of bias, which, rightly or wrongly, is often associated with privately sponsored research. I am quite sure, for example, that our work would not have received its present acceptance, even after some considerable test of time, if I had not maintained it in name and in fact as a university function. There is, moreover, no question that we have profited greatly as a group from the critical and cooperative collaboration of our colleagues, as well as from the extensive clinical contacts which are so readily maintained in a

teaching hospital center. Our work involves clinical judgment and experience, as well as the techniques of chemistry, physics, biochemistry, physiology, pharmacology, bacteriology and pathology. Our laboratory is in fact an institute of experimental medicine. It is difficult to see how we could carry on adequately in any other than a university medical center.

No doubt eventually we shall have an endowment fund sufficient to maintain the nucleus of our work in security. I am quite certain that some such endowment could have been obtained some time ago. I have not pushed the matter, partly for the reason that we have had no difficulty in obtaining funds to support our work, and partly because, under present circumstances, annual and lump contributions from time to time are more certain than the income from endowments. Moreover, there is a certain stimulating effect on the productivity of the entire staff, in the realization that the work must make its own way, on the basis of its utility as well as its quality. This point need not be labored, and indeed this condition might be regarded as one which would result in the promotion of hack-work of an immediately practical type rather than sound fundamental information. Nevertheless, while the present status of industrial toxicology imposes the duty of obtaining clinically and hygienically useful data, there is also an opportunity for developing basic physiologic concepts.