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EXPERIMENTAL WORK IN PROGRESS
in
THE KETTERING LABORATORY

The general work of the Laboratory includes the clinical study of specific patients suffering from diseases suspected of being occupational in origin. Sometimes this turns out to be true - sometimes untrue.

Some of the work relates also to the investigation of occupational problems in industrial plants, where trouble or the threat of trouble has developed in relation to general or specific hazards.

The members of the staff are occupied most of the time, however, in investigations of the nature and extent of the hazards posed by the use in industry of old or new chemical substances or mixtures of substances in old or new industrial processes. The large proportion of these problems, like those that relate to specific patients and specific industrial plants, cannot be publicized. That is, they are the medical problems - the illnesses and the threatened illnesses - of people, whose relationship with the staff of this Laboratory are like those of private patients with physicians. If at these matters are referred to all in publications, they must be dealt with in general terms. In general, we avoid the discussion of specific investigations outside the Laboratory. Certain problems, however, which are now and have been under investigation for a long time, the results of which have broad applications in a number of industries, can be referred to.

1. One of these relates to the systematic investigation of the behavior of lead compounds in the animal organism in health and disease. Sometime ago a series of lengthy experiments on the fate of lead ingested with food by

human subjects were completed after some ten years of careful investigation. Somewhat similar experiments were then initiated wherein the fate of lead in finely divided form in the atmosphere inhaled by human subjects was investigated. These experiments have been in progress since 1950. They cannot be completed before 1960 at the earliest. This work serves to elucidate the physiological mechanisms for the handling of lead compounds in the human body, and, in addition, will provide the background of information on which standards of safety in relation to human exposure to lead can be established with precision. Such standards are needed for the purposes of industrial safety as well as those of public health. The effort to obtain basic and comprehensive information on the physiologic and hygienic aspects of this metal and its compounds has been one of the major activities of this Laboratory since it was founded in 1930. This work began in the Physiology Department of the Medical School in 1925.

2. A second major experimental problem in which the Laboratory has been engaged for many years is that of the behavior of the inorganic compounds of fluorine (and also some of the organic compounds of fluorine) in the animal organism. This problem relates to the health of industrial employees, primarily, but it also extends into the general community in a number of ways, of which the most obvious example is that of the addition of inorganic fluoride to community water supplies for the purpose of combatting dental caries by effects exerted principally, but not exclusively, during the early years of childhood.

The work on fluoride has concerned itself primarily with the establishment of the mechanisms in the human body for handling fluorides. Like lead,

fluoride is a normal and inevitable constituent of the human dietary, so that it is found in all food and in all human tissues in low concentration. Illness may result from the absorption of excessive quantities of fluoride, and the purpose of the investigation has been mainly to establish clearly the limits which distinguish between normal, safe and hazardous absorption of fluoride. Again, as in the case of lead, standards for industrial and public safety are required, in terms of the quantities of fluoride that may gain entrance into the human body by way of ingestion in food and water, and by way of inhalation from the atmosphere.

3. A third field of long-term investigation has involved the study of various aspects of the general problem of atmospheric pollution. These investigations, initiated prior to 1940, have concerned themselves with the detection and the quantitative measurement of many of the contaminants of the atmosphere in various parts of the United States. The most comprehensive observation have been carried out in Cincinnati, but a score of other industrial centers have been included in less extensive analytical surveys. One such survey, completed only recently under the financial sponsorship of the American Petroleum Institute, concerned itself with the concentrations of ozone and the oxides of nitrogen in a number of American cities. These substances in the atmosphere appear to be important components of the system of contaminants of the atmosphere in Los Angeles which react with each other, under appropriate conditions, to yield a compound (perhaps compounds) capable of causing stinging and burning of the eyes with weeping (a lacrimator or a "tear gas").

The "Preventive Medicine component" of the Department of Preven-

tive Medicine and Industrial Health, of which the Kettering Laboratory is the "Industrial Health component," is engaged, with some assistance from the Laboratory, in a fairly extensive effort to develop methods for the investigation of the human response to air pollution. That is, to determine means whereby the effects of air pollution on human health can be detected and measured. This extension and elaboration of the work of the Laboratory in this field, has been financed for the past three years by funds from the Division of Grants of the United States Public Health Service.

4. Still another problem of importance to industry in which the Laboratory has been active for some years, and will continue to work for years to come, is that of occupational cancer. A fairly elaborate program of investigation of the potential hazard of cancer of the skin in the petroleum industry was initiated under the financial sponsorship of the American Petroleum Industry several years ago. This work was extended to include the coal tar industry in 1954, by means of funds supplied by a group of manufacturers and distributors of coal tar. The concern of the industrial sponsors of these investigations has not been aroused by the outbreak of malignant tumors of the skin among the employees in these industries, but rather by the potentialities which reside in the cancer-inducing substances in petroleum and coal tar and in certain of the products of these industries. There is need to know whether these substances are exerting an influence upon the health of industrial employees, and whether preventive measures of one kind or another should be developed and applied. The purpose of these investigations, therefore, is primarily one of fact-finding, and secondarily one of preventive medicine.

Other types of occupational cancer, and in particular, lung cancer, is so far as it may stem from specific factors in the industrial environment are the subject of interest among the group of investigators who have been assembled at the Laboratory for the investigation of cancer. Some funds are available from industrial sources in support of investigative work along this line and others are being sought.

5. In addition to the foregoing series of long term investigations which serve as a firm nucleus for the general work of the Laboratory, a continual stream of industrial products - solvents, insecticides, plastics - are subjected to preliminary, brief or more elaborate toxicological investigation, in accordance with the practical needs of the situation. Some of these materials find immediate use, while some are under consideration for uses in which their potentialities for harm to people who may handle or use them are factors to be considered.