

PREVENTING INDUSTRIAL DISEASE

Experiments in Industrial Hygiene at the Harvard Laboratories (second article)

Part of the work of the Harvard University investigators in the subject of industrial hygiene was described in last week's issue of "Industry", in an article dealing with the studies of manganese poisoning made at the instance of the New Jersey Zinc Company, and with other investigations ~~of the harmfulness of dusts~~ which have been carried on at the Harvard laboratories with a view to finding out just how harmful dusts such as jute, cotton, or shoddy dust may be to workmen in factories or other industrial concerns. Last week's article, however, did not mention several important specific investigations made by the Harvard staff, and as these investigations show in striking fashion the aid which medical research may render in reducing the hazards of industrial work, they are worth describing.

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One of the Harvard studies was undertaken at the Ludlow Mills. The Ludlow Associates, large producers of jute products, were anxious to ascertain whether working with jute resulted in harm to their employees. The manufacturing processes subjected the workmen to dust which, in the main, consisted of fine particles of jute, but which also contained a certain amount of dirt accumulated when the jute was baled in India, *shipped to this country & unpacked*. Dr. C. K. Reiman and Mr. R. M. Thomson measured dust concentrations in the Ludlow Mills with the best apparatus available at the time (1919); Dr. Wade Wright made physical examinations of a number of the employees who had been exposed to jute dust over many years; Dr. Tobey examined the nose and throat condition of the same group of employees; and Dr. George Holmes of the Massachusetts General Hospital made x-ray photographs of their chests. The entire investigation took about a month and resulted in establishing that prolonged work in jute does result in certain

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One of the Harvard studies was undertaken at the mills of the Ludlow Manufacturing Associates at Ludlow, Massachusetts. The Ludlow Manufacturing Associates are large producers of jute products, and in some of the manufacturing processes, the workmen are subjected to dust which in the main consists of fine particles of jute, but which also contains a certain amount of dirt accumulated from the jute which is baled in India.

The Ludlow Manufacturing Associates asked the Harvard Medical School to carry on an investigation for them, with the object of ascertaining whether the work in any of their processes was injurious to their employees, and if so, how conditions might be improved.

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the investigation when these changes have been made in order to study the effects of the improvements in conditions.

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chronic fibrous changes in the lungs, apparently not of very serious character. The Ludlow Associates were advised on the basis of these findings, in order to be assured of their position, to install better ventilation in certain parts of the mills and so to reduce the dust to as great an extent as possible. A second survey of the mills will be made next fall in order to study the effects of the improvements made in the mills.

Another large investigation, this one on the subject of lead poisoning, was begun in the spring of 1921 for the American Institute of Lead Manufacturers, and financed by them for three years. It was the desire of the Lead Institute that the attack upon this problem should follow whatever lines the University believed profitable and that the investigators should feel free to go over work previously done. In order to accomplish this new task it was necessary to remodel the laboratories to some extent and to appoint additional personnel.

The first necessity in the whole problem of lead poisoning is that there shall be absolutely accurate methods for lead detection. Dr. L. T. Fairhall and Miss Annie S. Minot have spent the past year in reviewing and testing out published methods for lead determination in animal tissues, and Dr. Fairhall has succeeded in devising a method far superior to any as yet available. This method, while useful for refined laboratory work, is too difficult for ordinary clinical purposes, and Dr. Fairhall is now developing a shorter and simpler method for use in ordinary hospital and industrial practice. Other valuable facts have ^{already} ~~also~~ been secured by the investigators. Miss Minot, for example, has found that lead is stored in the bones; apparently it is invariably in some part locked up in the bones and may remain there for long periods of time. The next thing, therefore, is to find out how this lead is liberated

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with to be eliminated from the body or from poisoning
from the bones and ~~so causes poisoning~~. Dr. J. C. Aub and Miss Dorothea Smith
have been working upon the very peculiar effects upon the membrane of the red
cells by the lead ion, ^{effect} *will do much to* which explain anemia in lead workers. This whole inves-
tigation, however, is still in progress, and the results to date throw only
partial light upon the nature of lead poisoning.

More immediate results were secured in the study of tetrachlorethane poisoning undertaken in 1920 at the request of the president of an artificial silk plant. This plant used tetrachlorethane as a solvent for cellulose acetate. During the war *this substance was* ~~it was~~ used as a solvent in manufacturing airplane wing varnish. It proved a vigorous and fatal poison, and became a decided industrial hazard in war manufacture. It is of interest to know that at the time the Harvard investigation of the matter began, Dr. T. M. Legge, Chief Medical Inspector of Factories for Great Britain, was in Boston, and on visiting the plant expressed the opinion that the only solution of the difficulty would be either to find another solvent or to close the plant. Dr. D. C. Parmenter took over the clinical responsibility for examining the employees in this factory, and by instituting repeated examinations looking for certain early signs of poisoning has been able to minimize the danger entirely. There have been no fatal cases, and indeed no serious cases of tetrachlorethane poisoning in the plant.

Dr. Parmenter's work has been greatly assisted by the researches of Dr. G. R. Minot and Dr. L. W. Smith, who made an extensive study of the blood of tetrachlorethane workers and discovered that certain changes in the cells of the blood appear very early and give warning of greater damage to come. As a consequence of this discovery it has proved possible to add to Dr. Parmenter's physical examinations of the workers an objective test of the greatest value. The entire investigation was financed by the company involved at a moderate expense, and has resulted in safeguarding a manufacturing process that

might well have suffered serious injury and delay had matters run their ordinary course.

Another investigation has been carried on by Dr. Alice Hamilton with a view to learning about mercury poisoning in the felt hat industry. Several publications on the results of this investigation are now under way. The monthly "Journal of Industrial Hygiene", published by Harvard University under the direction of a distinguished international board of editors, is the principal medium of publication for such scientific papers. This journal was founded in 1919, and while the expense of publishing it has been heavy, there is little question that the accumulation and publication in scientific form, through this medium, of data dealing with industrial health is a valuable thing. Efforts have been made and will continue to be made to provide in the Journal a ^{considerable} ~~sufficient~~ amount of material of immediate practical interest to employment managers, whether or not they are equipped to deal with the more technical medical and hygienic material.

An article such as this cannot, of course, outline all the investigations made at the Harvard laboratories with a view to safeguarding the health of those engaged in industries. Those described above give, however, an indication of the possibilities of industrial hygiene. It is in a sense pioneer work which is going on today; but the results already accomplished are sufficient to show how much can be achieved if those who are responsible for the conduct of American industries call to their aid men of science who are equipped to deal in an authoritative way with the causes and prevention of industrial ailments and diseases.

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