NOV 0 1962
IN THE ARMS

Report of the Legal Committee given by Theodore C. Waters of Baltimore, Chairman Maryland Occupational Diseases Commission, at fourth fall meeting of Air Hygiene Foundation held at Mellon Institute, Pittsburgh, Tuesday, Nov. 14.

New legislation providing compensation to workers for occupational disease injuries has been enacted during the past year by Arkansas, Idaho and Maryland, and there are now 24 states and the District of Columbia that have occupational disease compensation statutes. In the states of New Hampshire, Oregon, Tennessee, Texas and Utah, commissions have been authorized to study the problem of occupational disease legislati and to submit reports to their State Legislatures during the coming year.

In the course of the administration of the compensation laws already enacted there has developed the necessity for amendments to clarify or correct some of their provisions. Important amendments have recently been made in the occupational disease laws of Massachusetts, Ohio, and Pennsylvania.

Litigation involving the constitutionality and interpretation of the laws has been before the courts in repeated instances and the judicial interpretation of their provisions has had far reaching effect upon the liability of employers and the benefits conferred upon employees.

At the last session of Congress there was introduced by Senator Murray Senate Bill No. 2256, designed to afford Federal assistance to those states that provide compensation for dust diseases. The Bill provides that a State compensation program shall not be approved by the Secretary of Labor except upon certain specified conditions. It also grants to the Secretary of Labor broad discretionary powers with respect to the approval of plans for prevention. This Bill failed of enactment at the last session of Congress, but will undoubtedly be revived in some form at the coming session.

Mr. Waters said: "I believe the Bill is objectionable for the following reasons:

PLAINTIFF'S EXHIBIT

UNDER AUSPICES NOVEMBER 1933

NWBB-0009879

"1. Its subject matter is peculiarly within the province of state jurisdiction. Industrial conditions within the states vary and, in enacting occupational disease compensation legislation consideration must be given to the particular problems, industries, standards of living and wage scales that prevail in a given state.

"2. The plan of the proposed law is to provide federal funds for the compensation of injuries caused by dust diseases in those states whose laws are approved by the Federal Secretary of Labor. The cost of compensation should fall upon those industries where dust hazards exist and not upon the taxpayers generally.....

"3. The law as drafted is vague and indefinite and grants to the Federal Secretary of Labor broad discretionary powers to approve or disapprove of state legislation.

"There are two features of this Bill which I believe to be sound and also indicative of the future trend of compensation legislation. The Bill prohibits the approval of a state compensation plan unless (1) provision is made for the payment of compensation for silicosis injuries equal to compensation for accidental injuries; and (2) the waiver of disability benefits by workers is prohibited."

Mr. Waters says further:

"As we have seen, amendments to many of the laws have already been made and further amendments will undoubtedly be necessary in order to perfect their administration. It is particularly interesting to note that in the laws recently enacted there has developed the tendency to create Medical Boards or medical examiners to assist the administrative agency in the determination of the fact of injury and the evaluation of the disability arising therefrom.

"Another tendency of recent legislation has been to liberalize compensation benefits to employees suffering with disabling silicosis or asbestosis. To me such amendments seem to be proper, so that ultimately there will be no distinction between the compensation payable for total disability from dust diseases and that payable for total disability from traumatic injuries.

"Of even greater importance is the activity in the various states to perfect the methods of prevention. Bureaus of Industrial Hygiene have now been established in thirty states and in the cities of Detroit, St. Louis and Baltimore.

"The public generally has adopted a saner attitude with respect to occupational disease legislation in the past year than has heretofore existed, and we have seen many evidences of the cooperation of employers, employees and state agencies to solve the various problems presented by this legislation. Our laws now enacted may not be perfect, but generally they have accomplished the purposes for which they were designed, namely, to provide reasonable compensation for occupational disease injuries and to establish the machinery to effect prevention."

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NOV 1938 AIR HYGIENE

HWBB-0009881

Report of Preventive Engineering Committee given by Prof. Philip Drinker of Harvard, Chairman, at fourth fall meeting of Air Hygiene Foundation held at Mellon Institute, Pittsburgh, Tuesday, Nov. 14.

For the last three years, Air Hygiene Foundation has rendered generous help to the Journal of Industrial Hygiene & Toxicology in the form of an annual gift which has helped defray the cost of publishing the Journal's abstracts of the world's literature on industrial hygiene.

In 1938, the Foundation established two fellowships at the Harvard School of Public Health. At present, these are held by two engineers working towards the Doctorate of Science Degree in Industrial Sanitation. The thesis work of these men is directed towards problems of direct interest to Foundation members.

An important problem in silicosis prevention and in the appraisal of silicosis risks is, "What is the most potent size of silica particles?" It is recognized that the most dangerous sizes are certainly below 3 microns, (a micron is 1/25,000 of an inch) but whether there are critical differences here between particles of 0.5, 1, and 2 microns has not been studied. Accordingly, ground flint (99.7% free silica) was separated into four fractions, 3.30, 1.65, 1.04, and 0.62 microns, and the fractions cleared, as far as possible from particles other than the above. Sterile suspensions of these fractions were then injected into the ear veins of rabbits twice at three-month intervals and the animals killed and autopsied periodically.

Preliminary examination of liver sections indicate that the fine particles are more rapidly taken up by cells than are the larger ones. Later examinations showed no striking effects with the two larger sizes (3.30 and 1.65 microns), while it looks as if the third and fourth (1.04 and 0.62 microns) produced the greatest changes. The final report on this study will be ready in about 8 months.

HWGB-0009882

The reason engineers want the information which we hope this study will bring is that we are responsible for measuring degrees of dustiness in workplaces and for controlling conditions. Also, we must design dust respirators. We would like to know what, physiologically, are the most important sized particles and then we can focus our efforts particularly against them.

An engineering corollary to this problem is "What is the most difficult size dust particle to wet when floating in air?" and "What can be done to make the modern air washer into a more efficient dust catcher?" These questions are important to the air-conditioning industry and to all plants where air is cleaned by wet methods. The graduate student who is working on the dust injections is studying commercial air washers with a particular view to the possible application of wetting agents (surface active agents). An incentive to the study of this problem has been the remarkable progress recently in the separation of non-metallic dusts by flotation, a method considered inapplicable to industry only a few years ago.

As evidenced by the number of papers published in the last year, interest in the vapors from organic compounds has become widespread. Firms selling equipment or materials in which such solvents are in any way concerned are generally alert to the problem. Methods for detecting and for recording such substances are being reported from numerous laboratories. At least three large firms have arrangements for investigating the potential risks of one new compound after another and thus to determine under what conditions they can be marketed and used safely. As compared with the silicosis field, it is likely that the interest and activity in these directions will increase rather than diminish as new compounds continually are being developed.

The design of electroplating tanks, baths, and vats using toxic solvents and liquids has not yet been placed on a rational basis. The purpose of the second Foundation research now in progress at Harvard is to investigate the characteristics of these solvent tanks and to provide a rational basis of design by studying their performance under various conditions.

NOV 9 1945 ARMS AND INDUSTRY

HWB-0009883

Small tanks, with lateral exhaust on one or two sides, have been used. Taking several liquids with widely different physical properties, trichlorethylene, water, toluol, triethylene glycol, the minimum ventilation requirements at various temperatures and evaporative rates have been determined. This phase of the work is now nearing completion.

With reasonable surety it may be stated that the required ventilation in CFM (cubic ft. per minute) varies as the evaporative rate to an exponent. The use of a minimum quantity, rather than a minimum velocity, has been found necessary in the case of fumes, vapors, and mists, and it is believed that this work gives adequate basis to that fact.

The second phase of the work has been to ascertain the velocity charscteristics of these tanks. the velocities at all four tank corners and at the sampling point are being determined to find which location will give the best and most satisfactory correlation with vapor concentration.

In addition to the above work, a new vapor-pressure instrument for determining organic solvents in air has been developed. Also, a new dust-counting instrument revision was made.

The development of instruments for recording continuously low concentrations of toxic vapors should interest the members of this Foundation. Many firms using toxic solvents must either continue to use them or else take up an entirely new line of manufacture -- often they cannot use harmless substitutes. Under such conditions, the plant management requires periodic sampling of the air to find out if ventilation is as it should be.

Recorders are available today for carbon monoxide, sulfur dioxide, hydrogen sulfide, carbon disulfide, mercury vapor, and carbon dioxide, while continuous alarms or detectors for inflammable gas mixtures are in fairly general use. Smoke recorders are common in general power plant practice. It is well within the realm of practical matters to develop instruments which will furnish reliable records, 24 hours a day, of air pollution from low concentrations of substances, such as benzol or carbon tetrachloride. We have every intention of pursuing the problem further in our work for the Foundation at Harvard.

As the result of Dr. L.U. Gardner's medical research, backed by many field studies by others, notably the United States Public Health Service, it is now possible to outline and carry out, with reasonable assurance, a reasonable dust-control program. Industry neither demands nor expects from experimental medicine great precision in these matters, such as toxic limits in air. In the field of silicosis they have very nearly got what they need and certainly they now know very clearly how many missing gaps can be filled out.

It is of some interest that the use of aluminum dust in the treatment of men who have had exposures to silicotic dust has definitely been suggested at least twice; once, to an important mining group, and again to the granite cutters' union. Furthermore, patents on the use of aluminum dust, both for the prevention and for the treatment of silicosis, have been granted.

What place, if any, the use of aluminum or other protector dusts may eventually have in silicosis control remains to be seen. In the meantime, we see no reason to reduce either engineering or medical control in any way whatever.

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NOVEMBER 1933 INDUSTRIAL HYGIENE NEWS

NWBB-0609885

NOVEMBER 1939
AIR HYGIENE

Abstract of research report on, "The Choice of Methods of Roentgen-Ray Examination of the Chest for Diagnostic Surveys," given by Dr. S. Reid Warren, Jr., Assistant Director, X-Ray Research Laboratory, University of Pennsylvania, at fourth fall meeting of Air Hygiene Foundation held at Mellon Institute, Pittsburgh, Tuesday, Nov. 14. Dr. Warren summarizes the new Foundation bulletin which will give the results of the study.. This pamphlet, designed as an "X-Ray Handbook" for Foundation members, will be issued in January.

Chest roentgenographic (x-ray) apparatus is expensive and complicated. Chest roentgenographic techniques are based upon criteria difficult for the layman to understand. Chest roentgenography is becoming an increasingly important procedure in industry; medical and legal aspects of the problem demand that such procedures be of the highest possible quality. The production of chest roentgenograms of industrial employes is such a new procedure that no standardized method has yet been generally accepted.

It is the purpose of this pamphlet, which is being prepared for publication by the Air Hygiene Foundation of America, to summarize in simple language the physical phenomena of chest roentgenography, the technical aspects of the apparatus, and the economical aspects of its purchase and use in industry. The authors hope that the pamphlet may be useful to industrial executives and to physicians in industry, as well as to roentgenologists.

Some readers of the pamphlet may be unfamiliar with the elementary ideas underlying the electrical phenomena in roentgenographic apparatus. Therefore, an appendix has been prepared entitled A Summary of the Facts and Theories Underlying the Operation of Roentgenographic Apparatus.

Chapter I is devoted to a description of the physical phenomena that occur when a chest roentgenogram is made. These facts are useful as a basis for understanding why commonly used chest roentgenographic apparatus, described briefly in Chapter II, has been developed. The description of the physical phenomena also leads to definite conclusions concerning the advantages and disadvantages of the various types of equipment described in Chapter II.

In Chapter III knowledge of the physical phenomena and knowledge of the characteristics of the apparatus are used as bases for developing the criteria for the choice of roentgenographic techniques that produce the best possible films with each of several kinds of apparatus. In Chapter IV several methods of making roentgen-ray chest surveys are described. It is the purpose of this Chapter to show how the apparatus and techniques described in previous chapters may be most economically and conveniently adapted to the problem of making many chest roentgenograms of individuals who work in industrial establishments. The conclusion of this Chapter comprises a discussion of the relative advantages and disadvantages of each of the several methods for making roentgenographic surveys that are described in the Chapter.

In Chapter V the essential facts concerning the required results of a chest roentgenographic survey in industry are described. This leads to the choice of the particular survey methods that are, in the authors' opinions, best adapted to the problems of industry. It is shown in this section that certain problems, the solutions of which might lead to more convenient and more economical survey methods of high diagnostic quality, have not yet been solved. Nevertheless it is possible to make specific recommendations of methods for making chest roentgenographic surveys in industry with the apparatus now available. The salient conclusion from this review of the technical aspects of chest roentgenography is that it is unwise to compromise the diagnostic quality of roentgenographic results in the interests of economy or convenience.

HWBB-0009887

Address by V.P. Ahearn of Washington, Executive Secretary, National Industrial Sand Assoc., in forum on, "Impact of Employee Health on Industrial and Public Relations," at the fourth fall meeting of Air Hygiene Foundation held at Mellon Institute, Pittsburgh, Wed.P.M.Nov.15.

INDUSTRIAL HYGIENE FOUNDATION

At this fourth annual meeting of the Air Hygiene Foundation, we have had a fine opportunity to survey the whole field of occupational disease and its prevention. We have received the counsel and advice of men with distinguished records in medicine, in engineering, in law, in management, and in labor organization.

It seems to me a great compliment to the Air Hygiene Foundation and to its management that these men have been willing to take the time to come to Pittsburgh and participate in this round-up of our knowledge of occupational diseases and their control.

These men share with you and me a belief that the Foundation has performed a vital service to industry and that its future program is one which should command the support of all who realize that health in industry is a job which industry itself must tackle if burdensome regulations and unpleasant laws are to be avoided.

Industry has already made fine progress on this question of occupational disease. We can take a pardonable pride in the accomplishments of the past few years. The modern industrial environment represents a great improvement over conditions which have existed in the past and which in many cases were admittedly prejudicial to the health of the worker. Industry has therefore shown what can be done, and I am confident that under the auspices of the Foundation, the future months will witness continuous progress toward our goal of ridding industry of the preventable sources of occupational disease.

I have been among those who felt that too much attention was being given to the purely punitive phases of occupational disease control. It seemed to me that undue emphasis was being placed upon legislation, both by representatives of employers and representatives of employees. Legislation is always the source of hot controversies, and in the struggle for position which marked the efforts of the contending parties, not enough consideration was being given to the fact that no money compensation, however large, can compensate a man for the loss of his health and possibly his life. Our job in this field must be to prevent occupational disease. I hope we will never lose sight of that fact.

We shall be badly advised if we do not recognize that this whole matter of occupational disease is one of tremendous obligation and tremendous responsibility. Its correction needs the intelligent assistance of all. The engineer must guide us along the path of prevention; the doctor must teach us how to cure and he must help the engineer in teaching us how to avoid conditions which cause occupational diseases; wise laws need to be drawn, not only for the assurance which such laws give to employers and employees, but also because they do act as the spur toward correction of conditions which lead to occupational diseases; management must first recognize the obstacle and then do something about it; and the workers must cooperate in the whole program if industry is to do the job of which it is undoubtedly capable.

Industry wrote a fine page in American history when it grappled successfully with the problem of physical safety. Industry can do the same thing with occupational disease. It would be futile to deny that when workmens compensation insurance laws were first proposed, almost every branch of American industry registered its

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vigorous opposition. It was felt that nullification of common law rights accruing to the employer, and the substitution of fixed schedules to be administered by a state commission, would soon impose intolerable costs upon industry. It was even said that workers would become indifferent to their safety and invite accidents because of the certainty of compensation.

We know now that those fears were groundless. We found that the reduction of accidents brought new compensation - in human health and happiness, and in more efficient industrial operations. This is not to say that all compensation insurance laws have been marked by the ultimate in wisdom, but it does insist that industry itself would be highly vocal today if it should be seriously proposed that we return to the common law system of compensation for industrial accidents.

Not until recently did industry make any serious effort to tell the story of its accomplishments. None can fail to look with satisfaction on the record which industry has made in lightening human labor, in adding to our national wealth, in the creation of new industries and in the furnishing of new employment, in raising American standards to new high levels, in lowering the cost of goods and necessities, and in opening up new possibilities for the satisfaction of human wants. Through research and through the application of a high order of intelligence, industry has done these things, and more recently we have come to understand the importance of industrial achievements in respect to emancipation of the United States from dependence upon importation of certain goods which are necessary in our national life.

Industry at last has begun to tell the public what it has done and what it is doing. Business leaders are beginning to resist the temptation to become overnight experts in constitutional law and are devoting their time to talking about the things concerning which they are really equipped to talk from experience and training. Only recently it has done a grand job of convincing the American public that industry wants peace and is opposed to war. Not so long ago, many professional peace advocates were insisting that the exact opposite was the attitude of industry.

We are going to consider in this forum the impact of employee health on industrial and public relations. The discussion will be led by two men who are thoroughly qualified to do so. We shall hear from them as to how industry can best go about the job of building a favorable good will toward itself in carrying out industrial health programs. But they are realists enough to know that public good will toward industry does not depend upon the coining of trick slogans, and they know that industry will enjoy public good will if it does the job which entitles it to claim that good will. One prominent organization of industry took as its slogan "What helps business helps you" but I often wondered why that was not turned around and phrased "What helps you helps business." I think that the latter can be more easily supported than the former

This field of public relations is a brand new one. I think that its fundamental justification has too often been ignored. A lot of fellows named Joe have suddenly bloomed into industrial counselors (whatever that means) and they seem to operate under the fixed conviction that public relations is a job which represents the industrial equivalent of a theatrical press agent. Mr. Carr and Dr. Sappington are happy selections for this program because they know from a long personal experience that public relations is something which is of lasting value only when the industrial policy is based upon a sound public policy. We shall hear from them as to how industry can utilize health in industry as a basis for improvement of public relations. No more important question could come before this body, because regardless of the turn of political events in the future, every worker in the United States has become acutely conscious of the great importance to himself and to his family of freedom from occupational disease. I know that industry, always realistic in the long run, will recognize that fact and adapt itself to it. I take pleasure in presenting Mr. C.C. Carr, Advertising Manager of the Aluminum Company of America, who will discuss the broad aspects of public relations in industry.

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INDUSTRIAL HYGIENE NEWS

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Abstract of discussion by C.C. Carr, Advertising Manager, Aluminum Company of America, Pittsburgh, in forum on, "Impact of Employee Health on Industrial and Public Relations," at fourth fall meeting of Air Hygiene Foundation held at Mellon Institute, Pittsburgh, Wed. P.M. Nov. 15.

It goes without saying that any manufacturer with an ounce of intelligence realizes the dollars and cents value of industrial health and, when shown, is perfectly willing to spend money to make the conditions of his plants conducive to this result. Furthermore, he has humanitarian instincts over and beyond the money angle and is just as anxious as the employee and more anxious than the rank outsider in having the best possible health conditions in his operations.

Unfortunately, industry has too often been placed on the defensive in the eyes of both employees and the public because much attention has been paid to money compensation to workers whose health has already been lost, to state legislation for an occupational disease law in cooperation with the insurance companies, to answering criticisms of industry after it has been attacked in some specific incident. Too little attention has been given to what industry is doing toward eliminating occupational disease. In short, the engineer and the physician who work quietly and effectively on the long range job have had too little public notice while the lawyers, the law makers and the insurance companies have had the lime-light. The latter group are essential but a constant parade of their activities builds up a resistance toward industry all out of proportion to the true situation.

Much of this is the fault of industry, itself. When a new safety device is installed, an improvement made on an old one, or a new method adopted to improve air or light conditions in a plant, too often the operating department says: "Why publicize it and thereby call attention to conditions that existed before?" I feel certain there are some members of the Air Hygiene Foundation whose operating people think it might be just as well if nothing were said about their support of the fund. Public relations men have just the opposite view-point. They think all these things should be talked about publicly.

Admitting that the operating man who wants to soft-pedal these activities, may have an occasional point especially when there is danger of a racketeering lawyer sensing a damage suit for possible "sufferers" before the improvement was made, I cannot see that the attitude of silence is good in the long run. Everyone, whether an industrial worker or not, knows that plant conditions are constantly improving. Perhaps he knows this best if he is an industrial employee. The person who knows least about it is one who belongs to that vast army known as the general public. Announcements of plant improvements or innovations which improve the health and the working conditions of employees should be constantly passed on to the public which is the final referee in any broad discussion leading to legislation.

Furthermore, industry can build for itself a still broader acceptance in the public relations task it has to accomplish, if it gets the public to understand that it is, after all, human. In industry's story of itself to the public it has stressed achievement but has done little on the humanitarian side. Research and development, improved products, lower manufacturing costs, the benefits of integration, creation of jobs and kindred stories are being constantly told in institutional messages while the things industry is doing to improve the health and safety of its employees is infrequently mentioned.

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NOV 1 1962
INDUSTRIAL HYGIENE FOUNDATION

HWBB-0009892

Abstract of discussion by Dr. C.O. Sappington of Chicago, in forum on, "Impact of Employee Health on Industrial and Public Relations," at fourth fall meeting of Air Hygiene Foundation held at Mellon Institute, Pittsburgh, Nov. 15.

1. The cost of illness among industrial employees is the greatest drain upon industry. Industrial health work can be the most significant factor in the control of these losses.

2. The evolution of most industrial health services has been slow but substantial. A start can be made only by knowing one's own situation, and obtaining and applying expert knowledge properly. Confidence and quality of service are the fundamentals.

3. The problem of small group services has become a fetish. Definite experiences have shown the possibilities, and tangible results well in proportion to money expenses. No small group need be without a valuable form of health service.

4. An ideal service makes possible continuity of employment; increase in quantity, quality and permanence of production through improved health conditions.

5. Personal health means different things to different people; basic factors are heredity and early environment, but simple principles coupled with adequate information and the will to do have accomplished great results. Sound health information, continuously and wisely administered adult health education is a prerequisite to successful industrial health work.

6. Industrial medical services need more emphasis on important health procedures, such as pre-employment and periodic examinations, supervision of the correction of physical defects, and first aid to minor illnesses. Beneficient results of such measures are now too obvious to be overlooked by any but the pecuniarily stubborn.

7. The objections of most employees to these procedures are not usually founded on facts, but mainly on misinformation, superstition, and most of all, on the fear of losing a job. The greatest proportional returns can be secured through these measures, but they cannot accomplish this end if arbitrarily used as "clubs."

8. The sources of the most costly kinds of illness among the employees are largely nonindustrial - but the effects are industrial. Control is possible through the application of industrial resources, however, in cooperation with those of the community and the private physicians. It is impossible to separate from industry the good influence of industrial health on the community, including homes and schools.

9. Among the special problems which will receive greater attention in the industrial health work in coming years are fatigue, posture, noise, nutrition, mental hygiene, absenteeism, recreation, illumination and ventilation. Much has been done on most of these, but if we could apply present information, the salutary effects would be amazing; although more research may be indicated and although many are enticed by the glamour of research, the vital need is prompt and adequate use of what we know.

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10. Industrial physicians (as have most nonindustrial physicians) have by and large been repairment in the past, with some exceptions. There have been great accomplishments in public health but these have never been applied in any large sense to the industrial population. The industrial physician should be a very influential and vital factor in the furthering of this cause.

11. Effective administration of industrial health services depends upon a clear conception of objectives; a balanced humanitarian and financial point of view; the steadfast cooperation of medical, industrial relations personnel, safety staff, and employees - and last but not least, an unwavering and insatiable ambition and drive, unremittently kept going.

13. Industrial health has and will continue to pay dividends upon whatever basis one may choose to calculate them - but the most important of these are the human dividends.

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NOV 1949 ARMS

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U.S. Air Force

HWBB-0009895

Abstract of report of Medical Committee by Dr. A.J. Lanza, Committee Chairman and Asst. Medical Director, Metropolitan Life Insurance Co., New York, at fourth fall meeting of Air Hygiene Foundation held at Mellon Institute, Pittsburgh, Nov. 14.

During the past year, Air Hygiene Foundation has continued to support medical research.

Dr. L.U. Gardner, at the Saranac Laboratory, has been continuing his studies on the effects of the inhalation of certain types of dust upon which he will report to us tomorrow.

Dr. S. Reid Warren, Jr., Assistant Director of the X-ray Laboratory at the Moore School of Engineering, University of Pennsylvania, will present an abstract of a discussion on the choice of methods used in roentgen-ray (x-ray) examination of the chest for diagnostic surveys.

An exceedingly interesting contribution, and one of great value, will be presented by Dr. Eliot R. Clark, Professor of Anatomy, School of Medicine, University of Pennsylvania. Dr. Clark's paper is entitled "Methods Used in the Microscopic Study of Cells and Tissues in the Living Mammal."

Working under the supervision of Dr. Clark is Mr. Darrow Haagensen. Mr. Haagensen will present a paper on "The Reaction of Living Cells and Tissues to Silica Granules as Observed Microscopically in the Living Mammal." The value of this work which has been carried on by Dr. Clark and Mr. Haagensen lies in the fact that they have devised a method by which they can study the action of silica on the body tissues, maintaining such observation for indefinite lengths of time.

Among the events of the past year of special interest to members of the Foundation, I would like to call attention to a recent case in Ohio. This concerned a longshoreman, whose work for 26 years had been as a handler of grain, his job being that known as grain scooper. Apparently he had tuberculosis in 1918 but recovered. The disease again returned in 1934 and in 1936, he was entirely disabled.

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Compensation was awarded on the ground that his employment required him to work in thick grain dust, causing the latent tuberculosis condition to become active, and that, therefore, the injury sustained was an occupational disease. The case was appealed to the U.S. Court of Appeals where the award was confirmed. The case was referred to the Supreme Court in Washington, who refused to review it.

I mention this here because it bears out an opinion that many of us have expressed in recent years, namely that tuberculosis occuring in an industrial worker who is exposed to any kind of dust may be considered as of an occupational nature and the trend is very clearly in the direction expressed by this Court decision.

Another event which may possibly mark an important mile stone in the administration of health supervision in industry is the physical examination program inaugurated by the Industrial Commission of Wisconsin. This is a comprehensive and far-reaching plan of compulsory pre-employment physical examinations and periodic physical examinations made applicable to all the industries in the State. Pre-employment examination includes not only the ordinary physical examination but an X-ray film of the chest, a blood test for syphilis, urinanlysis for sugar and albumin determinations, a hemoglobin determination, and a red and white blood cell count.

The periodic re-examinations are to include the same procedures as outlined for the pre-employment examination and are to be made at two year intervals, except in those instances where the nature of the work or the patient's condition would lead the physician to believe that the examination should be made more frequently.

This program also specifies the examination record forms to be used and the plan provides for the reporting of certain information to the employee and to the family physician. Consideration is also given as to what conditions shall influence employment or the continuation of the employment. All examinations are to be made by physicians selected by the employer, unless some special consideration prevents, and at the cost of the employer.

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NWBB-0009898

NOVEMBER 1939

AIR HYGIENE FOUNDATION

Abstract of report of Membership Committee given by C. E. Ralston of Pittsburgh, Committee Chairman, Safety Director, Pittsburgh Plate Glass Co., at fourth fall meeting of Air Hygiene Foundation held at Mellon Institute, Pittsburgh, Wed. P.M. Nov. 15.

In studies of the effects of dust, a very important factor is the size of dust particles. We do not expect to find in the lungs quartz particles larger than 10 microns. (A micron is 1/25,000 of an inch.) But medical science has been telling us for some time that not all sizes are harmful; and of those that are, not all sizes are equally so. Yesterday (Tuesday) Prof. Philip Drinker asked the question: "What is the most potent size of silica particles" and answered from evidence secured on a research supported by Air Hygiene Foundation, that "Preliminary examination of liver sections indicate that the fine particles are more rapidly taken up by cells than are the larger ones. Later examinations showed no striking effects with the two larger sizes used (3.30 and 1.65 microns), while it looks as if the third and fourth (1.04 and 0.62 microns) produced the greatest changes.

Yesterday (Tuesday) afternoon, in reporting the progress of the Foundation's research at Pennsylvania, Mr. Darrow Haagensen said that, in the transparent chambers attached to rabbits' ears, it was noted that the living cells have ingested the small particles of silica (he used particles ranging from 1 to 7 microns), while the larger particles do not appear to be in the cell bodies.

This morning Dr. L. U. Gardner told us that evidence indicates that particles above 3, or perhaps 4 microns can be disregarded in evaluating a silicosis hazard. He said further that animals infected with low virulent tubercle bacilli do not develop progressive tuberculosis when injected with quartz particles larger than 3 microns.

So we have heard evidence from three angles of study of this problem. Perhaps, through such Foundation supported research, we shall be able soon to tell the engineer definitely what, physiologically, are the most important sized particles, so that his efforts may be focussed particularly against them.

The study of relative settling rates of unit sized particles of different minerals and mixtures of minerals, which Dr. Gardner reported, emphasizes the importance of taking dust samples in the worker's breathing zone to determine the extent of the hazard. Rafter and floor samples just won't tell th story.

Dr. Gardner also stated, as the result of experiments with pneumococcus infection in rabbits having silicosis, that pneumonias are no more common in silicotic subjects than in normal ones and that their course is not unfavorably influenced. Another important group of experiments started at Saranac to determine whether individual susceptibility to silica dust is acquired or whether it is due to innate peculiarities of different individuals.

On one of the Foundation-supported Fellowships at Harvard, they are endeavoring to determine "What is the most difficult size dust particle to wet when floating in air?" and "What can be done to make the modern air washer into a more efficient dust catcher?" The answers to these questions will be of great value to industry in making for improvements in design and efficiency of preventive methods.

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NOV 10 1942

The x-ray side has not been neglected. Dr. Warren gave us an abstract of the new bulletin, a companion to that issued by the Foundation last year, which will be a valuable guide to all interested in the purchase or use of x-ray equipment for chest examinations.

Interest in the vapors from organic compounds, Prof. Drinker told us, has become widespread and will increase, as new compounds continually are being developed. The design of electroplating tanks, baths, and vats using toxic solvents and liquids has not yet been placed on a rational basis. On the second Foundation research now in progress at Harvard, they are investigating the characteristics of these solvent tanks, to provide a rational basis of design through a study of their performance under various conditions.

All upon which I have commented thus far were reports on fundamental research supported by the Foundation, from its annual income derived solely from the dues of its members.

Mr. Robert J. Watt's paper and the discussion that followed were interesting as showing the viewpoint of labor toward the effort of the Foundation to improve employee health. In such effort the employee is the primary benificiary.

Mr. Theodore C. Waters presented a valuable digest of happenings in the legislative field. His annual discussions, supplementing the bulletins prepared for the Legal Committee, have proven of great value, not only to the legal departments in industrial concerns, but to management.

The experience of the St. Joseph Lead Company as recited by Mr. Andrew Fletcher, proved that the promotion of health in industry brings substantial returns in dollars and cents as well as efficiency, contentment and community welfare. This is an apt example that can be followed by many others and marks a milestone in presenting this intangible subject in terms of costs.

A departure on the part of the Foundation this year was the symposium on absenteeism, over which Dr. A. J. Lanza so ably presided. The importance of this problem cannot be overestimated, when we realize that the average of employee absences totals to 8 or 9 days per year. Anything that can be done to reduce this will be of benefit to employee and employer alike.

Another keynote was the forum on human relations. We are too prone to wear near-sighted glasses and to see only those things that are close to our hands. Industry needs public goodwill; it needs to consider the impact of its activities upon the community in which it operates and upon the general public that buys its goods and that formulates public opinion. Industry should take the public into its confidence and tell the story of what it is doing to make better working conditions.

In addition to the papers and discussions, Dr. H.B. Meller, Managing Director, outlined the day to day services the Foundation provides. The valuable monthly digest of literature, the plant surveys, the replies to many specific technical questions, the unselfish services of Committeemen -- these are among the many constant services the members ask for and receive.

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NOVEMBER 1962 ANNALS OF THE

SICK ABSENTEEISM

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I. INTRODUCTION

For a number of years, there has been an increasing feeling that the enormous wastage resulting from sick absenteeism could be diminished. The striking example of the safety first movement became more and more a spur inciting towards accomplishment in this related field. If such extraordinary results in reducing the number and severity of accidents could be accomplished by planned, co-ordinated effort, perhaps similar organization of effort might be directed against sickness. Records were formulated, statistics began to accumulate until presently at least the size of this problem could be estimated with some accuracy. In due time, there emerged the figures of 8 plus days per male wage earner per year and 12 plus days per female wage earner per year as the average toll paid to disabling sickness and injury - a truly staggering total whether viewed from the point of health or of money loss and at least five times greater than the corresponding figure for industrial accidents. It was apparent, as soon as serious attention was given to sickness absenteeism, that it was a much more complex and elusive problem than was presented by accident prevention.

The onset of sickness is unaccompanied by the dramatic incidents so often characterizing accidents. Both the cause and the onset are, most frequently, outside of actual employment and not related to it. Not only are the causative factors frequently obscure, but the diagnosis itself may not be certain. Sickness may be acute or chronic, each type presenting its own problem in both the medical and administrative aspects. Underlying sickness loom social and economic influences, in themselves a problem of the first magnitude and, generally speaking, outside of the sphere of the individual physician or the personnel director.

In their effort to define their problem, the various industries developed records and methods of record keeping that seemed suitable to their needs. Inevitably the records of both medical and personnel departments became fairly complicated and frequently of little use for comparison with other industries. Some recorded sickness on a working day basis, others on a calendar day basis. Many industries, for record and payroll purposes, discharge their sick employees after a variable period of weeks and months, and then rehire them. Others may carry an individual for as long as a year before taking him off the medical department and payroll records. All these variations have to be taken into account before evaluation of data and their comparison is possible.

Comparisons of the frequency and severity rates of different companies and sometimes of branches of the same company, are affected also by differences in the age composition of the working population. Those plants with a larger proportion of older people may have higher frequency and severity rates merely for that reason. The findings for groups of laboring and other unskilled workers may not be compared directly with those for the more skilled and better paid workers, for we know that low income classes have a higher sickness rate than those more favored. However, in industry, owing to the fact that the unskilled are frequently not paid when they are away, whereas the more skilled employees, having greater length of service, are paid, it may be found that the unskilled have the lower incidence rate.

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Thus we are confronted at the very beginning with the difficulties and complexities resulting first, from our efforts to recognize and classify types and causes of illness, and second from the methods of recording and enumerating the resulting information. Fortunately for some years the United States Public Health Service has been collecting figures from a group of industries and has lent its weight towards uniform practices in recording sickness facts. In the preparation of this material, the writers also had the benefit of consulting records and reports submitted by officials of about a dozen firms of widely divergent nature.

II. THE TWO PHASES OF SICK ABSENTEEISM

Practically all of the present schemes of sickness benefits, whether mutual benefit or insurance company, commence to pay benefits at the end of the first week. Hence, the first major classification of industrial sick absences -- those from 1 to 7 days and those over 7 days.

There is available a considerable amount of information relative to sickness among groups of wage earners covered by mutual benefit and insurance plans, but the total number of all wage earners included under such plans is but a very small percent of all wage earners. As in other situations, the employee who is one of a small group has less opportunity for protection against emergencies than one in a large group.

Many employers who have never analyzed their absenteeism record would receive quite a shock if they were to find out how frequent are absences of more than a week's duration and how many days their employees lose by such absences. Sickness and non-occupational accidental injuries, resulting in more than seven days of incapacity, caused 96 absences among every 1,000 male employees, and 135 among every 1,000 female employees annually on the average, over the period 1935 through 1937, according to an analysis made by the United States Public Health Service of the records of a large number of companies representative of a variety of industries. The days of incapacity resulting from these disabilities were equivalent to 3.7 days annually for each male employee and 4.8 days annually for each female employee.

The rates for individual companies, of course, vary considerably. One large company with ten plants located in various parts of the country, whose records were made available, reported about the same frequency rates, but an 18 percent higher severity rate for male employees, while the incidence rate for females, 202.4 per 1,000, was 50 percent above that for the female rate quoted by the United States Public Health Service and the average number of days lost was 7.7, as compared with 4.8. The frequency rates for sickness only in the ten plants, ranged for males from 46.8 per 1,000 employees, to 93.7 per 1,000, and for females from 121 to 221 per 1,000.

Respiratory diseases accounted for 44 percent of the male, and for 47 percent of the female disabilities among employees of companies reporting to the United States Public Health Service.

Occupational disease, that is disease actually arising out of the conditions of work, is a very small portion of the whole. It is possible only to make a crude estimate, as occupational disease compensation laws are mostly of recent enactment and the reporting of occupational diseases is admittedly inadequate, but from such records as are available, it may be stated that occupational diseases account for a fraction of a day in the sickness toll. That is not to say, however, that occupational disease may not be important in certain industries.

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What has been said about the relative infrequency of occupational disease, it should be made clear, refers to specific occupational disease. Information available from scattered sources suggests that there is a wide variation in the rates of incidence of some diseases not usually thought of as occupational, among men engaged in different occupations. Occupational hazards may or may not have been responsible for these differences. Detailed studies of departmental and occupational sickness records should be made by every company. Attention will thus be drawn to plant locations and operations where the sickness incidence is out of line and remedial measures can be introduced when the causes have been discovered.

III. DISABILITIES LASTING LESS THAN EIGHT DAYS

The short term disabilities lasting less than eight days are of the greatest concern to industry, particularly those resulting in 1, 2, and 3 days' absences. Those disabilities lasting less than eight days accounted for 83 percent of all absences among males, and for 87 percent of all absences among females, in the company experience reported upon by the United States Public Health Service. One, two, and three day disabilities accounted for 54 percent and for 66 percent of the male and female absences respectively. Approximately 12 percent of the days of disability among males, and 19 percent of the days of disability among females were caused by absences lasting from one to three days. Such other studies as are available to us give roughly similar results. These short term absences are due mostly to respiratory infections, gastro-intestinal upsets, and a variety of causes not clearly defined or diagnosed and among females dysmennorhea. In this latter group, experience is indicating more and more that a very important factor is mental and emotional instability.

Many of these short term disabilities, it is recognized, should really be charged to personal reasons rather than to the illnesses claimed to have been suffered. Companies which pay full, or a major portion of salaries or wages, for all disabilities, obviously are very likely to have many more one and two day absences than companies which take a less liberal attitude on the payment of salaries and wages during absence for illness. The correction of the abuse of a company's generosity is a matter of company discipline. But while the inclusion of these absences for personal reasons in the recorded toll of short term disabilities tends to overstate the magnitude of the problem of ill health, there can be no doubt that the larger part of the recorded cases represent true disabilities. These entail a heavy cost to the companies and a huge loss of wages to employees, many of whom receive no sickness benefits.

IV. CONSIDERATION OF CAUSES OF SHORT TIME ABSENCES

Circumstances which may cause or may modify short time absences may be classified under two headings:

1. Circumstances arising from conditions of employment.
2. Circumstances arising from the nature of the individual.

Granted that a workman may be feeling ill or suffering from definite symptoms, his actions will be influenced by economic considerations as well as concern for his health. Under the first heading may be included:

Possible loss of wages.
Fear of losing job (possibly dependent on status of labor market).

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Attitude of employer towards sick absenteeism.
Attitude of plant medical department (if any); that is, whether short time absences are closely checked; whether any effort is made to control them, both by prompt medical attention and effort to discourage absences deemed unwarranted.

Under the second heading are included real difficulties and perplexities inherent in this problem. Herein are comprised all the variations, mental and physical, that distinguish individuals and set one man apart from another.

Some persons are careless or indifferent to matters of their own health and will continue to work where another would seek medical treatment. Others again are over-apprehensive and their actions are controlled by fears that may be well grounded or imaginary. One pampers himself, another neglects himself. Mental and emotional attitudes will not only affect an individual's response to symptoms, but may in themselves originate sickness. Many persons are unduly sensitive to disturbing factors that may arise in the home, in connection with their work, or from other employees. Thus, in this total of short time absences are included definite physical upsets of a real but usually temporary nature and those associated with mental and emotional disturbances of one kind or another. The latter, particularly, are difficult to deal with as they may affect the other employees and their condition is often not recognized.

V. OTHER CONSIDERATIONS IN CONNECTION WITH SICK ABSENTEEISM

The sickness prone individual. Are there such individuals who may be compared to those who are accident prone? Obviously, the answer is in the affirmative. Persons who harbor a chronic sinus infection, to mention only one common infection, are apt to have more sick days off than those not so handicapped. It is commonly found in statistical surveys that a small percentage of employees have an inordinately large number of illnesses and lose many more days on the average than other workers. Thus in the experience of the Civil Service of Canada, 1936-37, 72.8 percent of the employees had no illnesses lasting four days or longer, 20.2 percent had one illness, and seven percent more than one illness. Those who had more than one illness (seven percent) accounted for 46.5 percent of the total illnesses and 39.3 percent of the total days lost. There were 118 employees with five or more illnesses, or .3 percent of the total, who accounted for 2.0 percent of the total time lost. In another company, it was determined that about 60 percent of the employees had no illnesses lasting three days or longer, 9.3 percent had two or more such illnesses, and were responsible for 37.8 percent of the days lost, while 2.4 percent had more than two illnesses and were responsible for 13.1 percent of the days lost.

Can the accident prone be linked to the sickness prone? The question has been given scant attention. No definite answer, therefore, can begiven. A few companies, however, have inquired into the matter and find that those employees who had poor health records also had poor safety records. The subject merits further study.

Some slight attempt has been made to link defects found on pre-employment examination to subsequent sick absenteeism. But here again the evidence is meagre. One company some years ago determined that days lost for sickness, industrial accidents, and for non-industrial accidents, were lowest among those employees classed as having no physical defects of consequence, and highest among those suffering from some gross physical defect.

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VI. WHAT CAN BE DONE?

There is enough evidence at hand to indicate that the burden of sick absenteeism can be lightened by intelligent effort. As long as mankind is subject to inborn defects, to communicable infections, to mental and physical stress, we must expect sickness. One thing is clear, namely that the remedy does not lie in rigid standards of pre-employment physical examinations. There are those whose defects may make their employment harmful or dangerous to themselves or their fellow employees. Outside of this small minority, the remainder should and must have employment to as great an extent as possible. Even in the military services, in which men are hand picked both for age and physical perfection, and constantly under skilled medical supervision, there is a definite sick absenteeism.

With respect to short time absences, we can hope that acute respiratory infections may yet yield to some scientific discovery and thus do away with the major portion of one to three day absences. Medical Supervision which will take into account mental as well as physical states will further help to reduce the total. Here, as with the illness of longer duration, prompt treatment and correct diagnosis will lessen the duration of illness. Those who have chronic defects, such as diabetes, cardiac defects, and other organic disease, can in many, if not most instances, be kept on the job, to their own and their employers advantage, by proper medical supervision. In the control of chronic organic conditions much progress already has been made. That portion of sick absenteeism that is allied to mental and emotional deficiencies is still largely an unexplored field. It is here that the next advance in prevention and control can be looked for. It is not unreasonable to expect that the average loss of time from sick absenteeism can be materially reduced. This in itself would be a tremendous gain both economically and in human contentment.

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NOV 21 1949 AIR HYG. ASS'N

Medical scientists, looking through a "window" fastened to the ear of a live rabbit, are gaining new knowledge which may help combat dust diseases of the lung. Dr. Eliot R. Clark, Dept. of Anatomy, University of Pennsylvania, describes this work in a report, "Methods Used in the Microscopic Study of Cells and Tissues in the Living Mammal," presented at the fourth fall meeting of Air Hygiene Foundation held at Mellon Institute, Pittsburgh, Nov. 14. This paper, abstract of which follows, is preliminary to another report given at the Foundation meeting by Dr. Clark and Darrow B. Haagensen on the use of this method in a research for Air Hygiene Foundation now under way at the University of Pennsylvania.

There are certain natural transparent objects in living animals, such as the tadpole's tail, the bat's wing, the web of the frog's foot, and the mesentery of mammals, which are thin enough to permit microscopic observations on the living, and much has been learned regarding certain intimate life processes through their utilization. In order to overcome their many limitations and to provide in the living mammal a satisfactory place for long-continued microscopic observations both of the normal growth and behavior of tissues and of their reactions to physical and chemical experimentation in a controllable environment, new methods have been developed in our laboratory. These methods consist of the installation of windows or chambers, both single and double-walled, made of transparent material thru which or in which the living tissues and cells may be observed, often with the highest microscopic lenses.

The most extensively used method consists of the introduction, into the ears of rabbits, of double-walled chambers made of celluloid (cellulose nitrate) and mica or of glass and mica, so constructed that a rigidly maintained space of microscopic thickness 0.002" to 0.004" is left into which the living tissue grows. The transparent mica covering of this space is about 0.003" in thickness, permitting the use even of oil immersion lenses giving magnifications of 1000 diameters.

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When such chambers are installed in the outer ears of rabbits, new vessels and tissue including the elements found almost universally thruout the body, invade and eventually fill the space, after which they may persist for months or years. Protective splints and shields prevent trauma when the animal is not under observation.

For microscopic observation, the unanesthetized rabbit is fastened in a comfortable position on its back, the head held in a sort of stock, and the ear attached to a holder on the stage of the microscope. The rabbit remains quiet for hours, permitting microscopic observation and both still and motion picture photography. Various types of chambers have been developed which permit (1) the study of the original tissues of the ear--the "preformed tissue" chamber; (2) the study of the interaction between chemical substances and the living tissue by a chamber containing a small accessible reservoir--the "moat" chamber; and (3) the removal of the top of the chamber for transplantation of bits of organs from other parts of the animal, or for the introduction of experimental substances, such as silica granules--the "removable-top" chamber.

Chambers have also been placed in ears of dogs, and in body-wall skin flaps; permanent windows have been placed in the skull allowing study of pial circulation; loops of intestine have been kept outside the abdomen in transparent chambers, and progress is being made in introducing a window in the chest wall for direct study of the lung.

With the aid of these methods an extensive body of knowledge has been built up during the past 12 years by a group of investigators regarding the normal growth and activity of blood and lymphatic vessels, of connective tissue cells, and of tissue leucocytes and wandering cells. These are the cells and tissues which are chiefly involved in the reaction to silica dust in the lung and it is believed that further insight into this process may be gained by the utilization of these methods and of this accumulated experience in the study of silicosis and similar problems.

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Sick Absenteeism — Supplement

Upon completion of the paper by Dr. Lanza and Mr. Vane, the subject of Sick Absenteeism in Industry was further discussed by Mr. A.J.R. Curtis, Portland Cement Association; Mr. W.G. Hazard, Owens-Illinois Glass Company; Dr. R.R. Jones, Bell Telephone Company; Dr. O.A. Sander, Consultant; Dr. R.R. Sayers, U.S. Public Health Service; Dr. A.W. Schoenleber, Standard Oil Company of New Jersey; Dr. C.D. Selby, General Motors Corporation; and Dr. C.H. Watson, American Telephone & Telegraph Company.

These discussions in complete form, or even in comprehensive abstract, would be too voluminous to present here. However, it is the intention to publish a separate bulletin which will include the initial paper and all discussions in full. Copies of this bulletin will be sent to all who are on the regular mailing list for Foundation publications and to all others who were present at the meeting.

The next step in this program will be announced shortly.

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NOVEMBER 1939 AIR AGE, INC.

Abstract of research report on, "The Reaction of Living Cells and Tissues to Silica Granules as Observed Microscopically in the Living Mammal," given by Dr. Eliot R. Clark, Prof. of Anatomy, and Darrow E. Haagensen, both of University of Pennsylvania, at fourth fall meeting of Air Hygiene Foundation held at Mellon Institute, Pittsburgh, Nov. 14.

This research project sponsored by a fund established in the University of Pennsylvania by the Air Hygiene Foundation of Pittsburgh, Pa., is under the administration of Dr. E.P. Pendergrass, Professor of Radiology, and E.R. Clerk, Professor of Anatomy. The project of observing directly in the microscope the action of the silica compounds upon living cells in the living mammal is being worked out by Mr. D.E Haagensen under the Direction of Dr. E.R. Clark.

Development of transparent chambers installed in rabbits ears was aided by grants from other institutions. For the past 13 years microscopic observations have been recorded.

For this research project one of several types of microscopic chambers was first chosen, namely the one designed by Dr. R.G. Williams, Associate Professor of Anatomy. This chamber has a space the shape of a cylinder 7 mm. (.275") in diameter and 75 microns (.0029") in thickness for the living tissue under microscopic observation. (A micron is 1/25.000 of an inch.) The top of the chamber is removed under the sterile conditions of the operating room and various substances actually placed in the area to be studied. The top is then replaced and an airtight seal made around the periphery.

A chamber was placed in a rabbit's ear on April 20, 1939 and on June 6, 1939 the first placing of silica (SiO_2) particles in the chamber was done by Dr. R.G. Williams. Fine glass rods were used to pick up minute amounts of dry silica crystalline particles and placed in definite locations of the observation area. The top of the chamber was then replaced. This method of using dry glass rods gave a distribution of silica particles most of which range from less than 1 micron to 7 microns in size although a few range up to 30 microns in length. For each local application in the

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observation area of the living tissue a microscopic amount was placed in a definite area.

Frequent observations with various magnifications of the microscope were made daily. The unanesthetized rabbit was placed on a special board for observation. Photographs were taken of the whole observation area at two different magnifications. These serve as a record of the gross changes occurring in the chamber. For a period from June 6, 1939 to date the gross photographs have shown the relatively stationary groupings of the living cells called macrophages. These macrophages have ingested or taken in the small particles of silica. Thus to date there has not been a noticeable absorption of these silica particles. There are large silica particles which do not appear to be in the cell bodies of the macrophages or scavenger cells. These gross photographs of this specimen to date indicate an absence of any toxic effect from the minute amounts of silica particles used in this experiment.

Photomicrographs taken during the same period record the particular local action of the silica particles at a far greater magnification (500 diameters) so that individual living cells are easily observed. To date these photographs indicate that the silica laden cells, namely the macrophages, tend to be very sluggish but to move slightly from day to day. They manifest a pronounced grouping tendency with occasional slow scatterings and regroupings. Some of the larger silica particles 15 microns and up appear to be outside the macrophages and here, as in the macrophages, to show no reduction in size under the action of the tissue fluids.

Camera lucida drawings have been made to date of particular silica laden macrophages. These drawings substantiate the results seen in the series of photomicrographs. Connective tissue has grown into the chamber and completely covered the whole observation area. This growth of connective tissue to date is not of a more rapid than normally expected in this type of chamber. Lymphatic capillaries have grown into the observation area. They have thus far shown no special reaction to

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the silica areas. A rich blood vessel plexus is present throughout, but shows neither especial richness nor scarcity in the region of the silica nor does the endothelium show any noticeable reaction of even a mild inflammatory nature.

In summary, silica granules from 1 micron to 30 microns placed in living tissue consisting of connective tissue, blood capillaries, lymphatics and leucocytes, have been observed under the microscope over a period of nearly 5 months. The chief reaction has been the ingestion of most of the granules by macrophages many of which have remained alive and under observation during the five months. The silica-laden macrophages have been sluggish, showing a tendency to form groups, but have shown no recognizable toxic effect. No special reaction has been noted on the part of connective tissue, lymphatics or blood capillaries to the presence of silica-laden macrophages.

This outline of the activities of the project indicates the type and methods of the research work. Daily observations will continue to be made. Microscopic chambers in the past have been studied over a period of 2 years in a single rabbit. It is possible by using modifications of this chamber to place silica in other physical forms in the living tissue of the observation area. In fact chemical analyses can be made of fluid drawn off from the chamber. It should be emphasized that these observations represent the initial steps in this research project.

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