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its personnel and the uniform high caliber of its work, the Bureau's laboratories at Pittsburgh seem the logical place for such certification to be done. The manufacturer of protective equipment welcomes definite specifications he can meet, no matter how rigorous, and expects to pay the testing bill whether his equipment is passed or rejected. No private testing laboratory would be expected to undertake this type of work without charging the manufacturer a fee adequate to give the laboratory a reasonable profit. The Bureau's fees in the past, for this type of work, have been modest, but the funds reverted to the U. S. Treasury, and not to the Bureau's laboratory. Unless an absurd and wholly unnecessary hardship is to be placed upon the Bureau, it should be permitted to do such work on a cost, or pay-as-you-go, basis.

General Discussion

Chairman Greenburg after delivery of the papers invited discussion, which was lengthy and spirited. This may be summarized as follows:

Dr. H. K. Pancoast, Philadelphia, pointed out that while X-ray presents the best method of observing changes in the lungs and also for determination of their incapacity, most examinations are not thorough. This point is frequently overlooked. Expert evidence is very important in making a diagnosis and grading incapacity.

The point made by Dr. Russell, of the advisability of special boards to decide the physical status of employees exposed to silica hazards, was also emphasized by Dr. W. J. McConnell, Metropolitan Life Insurance Company, New York City. In this connection Commissioner R. G. Knutson, Wisconsin Industrial Commission, spoke of the difficulties experienced in handling compensation cases. He suggested amendments to the occupational disease laws in various states for the complete coverage of occupational diseases, so that claims can be decided by the commissions rather than by common law. The conflict of testimony by so-called experts appearing before the commissions is sometimes remarkable. In some cases a final decision has been necessarily withheld until after an autopsy. John Roach, Deputy Commissioner of Labor, New Jersey, advocated the appointment of a Medical Board to be paid by the State whose opinion in compensation cases should be final.

There is a great difference of opinion about these cases, said Chairman Greenburg; the compensation commissions differ, the doctors differ, and on the other hand, industrialists have not been alert to the situation; but they can do a great deal in the future. Compensation Boards in the past have been somewhat arbitrary in their decisions. Some time ago I suggested in Connecticut that the commission should be made up of a lawyer, a physician specialist, and an engineer; but this suggestion did not meet with very much favor.

Asked to outline how silicosis cases are handled in Canada, Dr. J. G. Cunningham, Toronto, Ontario, said: Our laws define the terms silicosis and tuberculosis, and they further define the industries and occupations affected, but they refer to mining especially. The cases come from the individual physicians and are referred to the silicosis board. When the claim is received, the board examines the records and the claimants, to see if the regulations of exposure have been complied with; if so, the claimant is personally referred to the silicosis board; two or three of the members examine the case personally, and then each case is decided by all three members of the board. The claim is then referred back to the compensation board.

Two other points of interest occur to me, he said further: first, we have had a number of stone cutters with 15 years exposure to limestone, contacting tuberculosis, but in every case the occupational history showed that they previously had cut sandstone; second, in an extensive examination of workers exposed to silica dust and alkaline powders, reports in the literature have shown the rapid development of silicosis, but in our experience an examination of two small groups with similar exposure has shown only a small amount of fibrosis. The importance of exposure to coal dust also has not yet been sufficiently realized.

Dr. J. P. Leal, U. S. Public Health Service, Washington, D. C., emphasized the point made by Professor Drinker concerning the use of masks, that the minimum pressure necessary to operate such a mask should be used, that a decision should be made as to what this is, and that we should be sure that pulmonary excursion does not operate against appreciable pressure and against proper and continuous lung ventilation.

It is important to find some workable protective device, said Mr. Roach, that will protect workers in sixty or seventy different industries where the exposure exists. It is possible that in laboratories a well made apparatus will work fairly well, but in the various industries workers are found who have sharp and irregular features, and many times a mask or respirator will not work on these faces as on other workers with round, smooth features. The protective device thus becomes a menace rather than a help. We are also very much concerned whether the filter is satisfactory and will properly strain out the particles.

It has been mentioned, said Dr. Russell, that some limestone and sandstone workers have had silicosis. We must remember that granite workers and others have shown the presence of silicosis, although they have not been directly exposed, and other workers beside cutters have shown the presence of silicosis, all of these cases being due to previous occupational exposure involving silica hazards. Recently we had a case of a man with silicosis and tuberculosis, his job having been loading coal (not a real silicosis exposure), but previously he had been a gold miner. He is now 50 years old, has tuberculosis, and three of his five children also give positive tuberculin reactions, which is against the usual conception that tuberculosis from silicosis is transmissible.

Professor Drinker said: I have been asked whether I consider a respirator a good protection if no other apparatus is available. My answer is that it would not be. In a high concentration of dust, if the respirator is functioning properly, it should reduce the amount of dust breathed. But a respirator is not really an eight-hour day apparatus. In other processes, however, where the work is intermittent and a workman is not obliged to wear his respirator continuously, it should function as an efficient protective apparatus.

WEDNESDAY MORNING SESSION

October 5, 1932

For the record of this joint session of delegates of the Industrial Health Section with the Chemical Section, see page 166 of this volume.

WEDNESDAY AFTERNOON SESSION

October 5, 1932

Chairman Greenburg, on the opening of this session, called for the report of the Nominating Committee and officers were chosen as follows:

For Chairman, Dr. R. G. Leland, American Medical Association, Chicago.
Vice-Chairman, Dr. W. R. Redden, American Red Cross, New York City.
Secretary, Dr. C. O. Sappington, Chicago.

Chairman Greenburg then introduced the first speaker.

injurious and are, therefore, removed from the sample. After proper dilution, the contents of the graduated flask are thoroughly shaken so that a uniform suspension is obtained, and two portions of about one cubic centimeter are removed with a pipette to just fill two Sedgwick-Rafter counting cells. The cells are allowed to stand at least 20 minutes and the dust particles are then counted by means of a microscope.

The microscope with an Abbe condenser is provided with an eyepiece micrometer, a 16-millimeter objective and a 7.X eyepiece. The eyepiece micrometer has a large square engraved on it, and this square is divided into 100 squares, one of which is further divided into 25 smaller squares. The proper tube length of the microscope is determined by calibration with a stage micrometer, so that a side of the large square of the eyepiece covers 1 millimeter (1,000 microns).

The large square of the eyepiece micrometer, therefore, encloses the dust in an area of one square millimeter, and since the counting cell is one millimeter deep, all the dust suspended in one cubic millimeter of the sample is under the ruled field. All particles visually less than 10 microns in longest diameter in one quarter of the field are counted at five points on the cell, namely, near the four corners and the center.

Two cells of each dust sample are counted and the average of 10 counts is obtained. Control counts are subtracted from the average sample counts, giving finally, average net counts of the number of particles which are then calculated in terms of particles per cubic foot of air sampled.

Having determined the concentration of dust particles less than 10 microns in diameter in a given atmosphere, it is also necessary to obtain information regarding the mineral composition of the dust before any evaluation of the health hazard can be made.

In general it may be said that the harmfulness of a quartz containing dust is usually in direct proportion to its free-silica (SiO_2) content. It is, therefore, necessary to distinguish between "free silica", that is the silica that occurs as quartz, and "combined silica", or the silica that is combined with other elements in the various silicate minerals. It should be borne in mind, therefore, that the total silica reported in the customary chemical analysis is no measure of the amount of free silica.

The quartz content of fine dusts is usually determined by a combination of petrographic and chemical methods. Each dust presents individual problems and no individual technique applies to all dusts regardless of their composition. Those interested in this problem should consult Reprint No. 1560 of the Public Health Reports, February 24, 1933, entitled "The Quantitative Determination of Quartz (free silica) in Dusts" by Adolph Knopf, Professor of Physical Geology, Yale University, and Consultant, United States Public Health Service.

Discussion of Dust Problems

By DR. LEONARD GREENBURG

Yale University, New Haven, Conn.

The speaker said in part: On the technical side of this problem you have been presented with two excellent papers by Mr. Jones and Dr. Meiter. There is little that I should add from this point of view. Perhaps the most valuable contribution that I can make is to present to you my own personal view of the broader administrative aspects of this problem gained as a result of many years of close contact. In order to do this, let us analyze the problem in its simplest terms.

We may begin by agreeing that pulmonary fibrosis results from the inhalation of certain dusts in known concentration over a sufficient period of time. This fact has been demonstrated repeatedly by means of industrial, laboratory and pathological studies. On this simple fact, I take it, there is complete agreement.

Such legitimate cases of disabling pulmonary fibrosis are held in many states to be the responsibility of the employer. Further, a perusal of the compensation laws makes it evident that there exists a decided trend in the direction of broadening the compensation acts throughout the Union for we find from time to time that additional states are being added to the list of those holding silicosis to be a compensable disease. We would certainly be blinding ourselves to the facts were we not to admit the existence of this trend in social legislation. It should be pointed out here that this is a very wholesome and desirable state of affairs. The insurance principle has justified its existence in spreading the burden of ill fortune over a long period of freedom from catastrophe and surely in the case of industrial accidents it has freed us from the deplorable state of affairs in existence prior to 1912. In the case of the occupational diseases we may hope for equally satisfactory results.

Nevertheless, compensation insurance is not the complete solution of the problem at hand.

The only adequate means of avoiding the burden of silicosis is by the prevention of this disease. All other methods do not touch the crux of the problem and they carry in their wake a vast amount of litigation, illness, and a large financial burden on industry. If what we have agreed upon to this point is true it is obvious that industry must prevent the dissemination of dust in the workroom air by such adequate engineering techniques as are available; or in certain cases where this is not possible industry must provide, and force the worker to use, such means of personal protection as will adequately safeguard him against the inhalation of dust. It is only by these means that we can guarantee a future free of disabling pulmonary disease due to dust inhalation.

In spite of the very best efforts of industry to solve this problem there will undoubtedly be a certain number of cases brought to the courts and presented as legitimate cases of silicosis. While some of these are true cases of silicosis others, I have been informed, are not, but are designed merely as a means of obtaining funds from industry. A consideration of such cases brings us logically to the second part of the present discussion. What is the ideal method of handling compensation cases with reference to occupational disease and more particularly silicosis?

If we examine the development of the compensation acts we find that a technique designed primarily to adjudicate cases of industrial accidents has by degrees been given jurisdiction over occupational diseases. In fact, in some states diseases are regarded as injuries so that they may be brought within the scope of the original compensation acts. But on close examination it becomes apparent that diseases are far more difficult to adjudicate than are the ordinary injuries arising in industry. They present many technical facets and often require a detailed knowledge of this particular branch of medicine with which the average commissioner is very often unfamiliar. As a result we find in practice that the Court is presented with highly technical evidence by experts for the plaintiff and for the defendant which is very difficult if not impossible to satisfactorily evaluate. Often the commissioner is caught between the conflicting views of such witnesses and is not provided with his own experts to aid him in arriving at the real scientific background of the problem at hand.