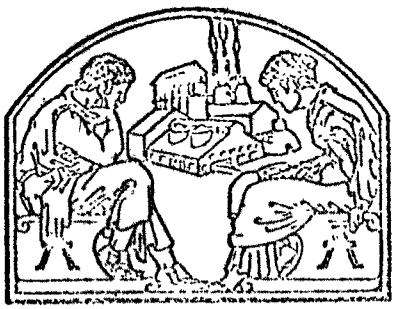
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Industrial Hygiene Digest

INDUSTRIAL HEALTH NEWS

LITERATURE ABSTRACTS

MEDICAL

ENGINEERING

CHEMICAL

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LEGAL

MAY, 1968
(Vol. 32, No. 5)

INDUSTRIAL HYGIENE FOUNDATION
4400 FIFTH AVENUE -:- PITTSBURGH, PA. 15213

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EDITORIAL

PROGRESS IN IHF ASBESTOS BIOEFFECTS RESEARCH

Dr. Paul Gross, Director of the Foundation's Research Laboratory, tells the story of two medical students observing the retina of a patient's eye, one describing anatomic configuration in detail, the other reporting that he saw nothing but blackness. The professor, noting that the opthalmoscopic lamp had gone out, **said "when competent observers disagree they are probably both right. By research we may be successful in explaining such differences."**

Dr. Gross used this story to illustrate the probable reason for differences in findings of Dr. D. C. Braun and T. David Truan of IHF who in June, 1958, reported no excessive prevalence of lung cancer in chrysotile asbestos miners in Canada, in contrast to the work of Drs. J. Knox and R. Doll in England, reported in 1955 (supported by earlier observations by Drs. K. M. Lynch and H. R. Pratt-Thomas in the United States), which indicated a 10 times higher rate of lung cancer in asbestos textile workers than in the general population. Dr. Knox now advises that the improvement of industrial hygiene in the above textile plant has successfully controlled not only asbestosis but lung cancer as well, to a point where the latter no longer exceeds the rate in the general population. Interestingly, his data point up another difference: they do not support the opinion of Selikoff, et al (see Abst. No. 448, this issue) regarding higher risk of lung cancer in cigarette smokers who work with asbestos, at least in the textile mill population which Dr. Knox has studied so closely for many years. The following direct quote from correspondence to Dr. Gross from Dr. Knox is published herein with his permission:

> "Drs. Irving J. Selikoff, E. Cuyler Hammond and Jacob Churg have come to some wide ranging conclusions on the subject of asbestos exposure, smoking and neoplasia and I do not feel that I can go with them all the way. This is especially so when we have achieved a notable reduction in our lung cancer mortality rate in a group of workers who are smokers almost to a man. Here are some points which occur to me: The results recorded in this paper are similar to our 1955 ones (R. Doll, Brit. J. Ind. Med., Vol. 12, p. 81) and would seem to represent the results of largely uncontrolled asbestos dust inhalation in spite of the fact that the group were classified as insulation workers. It is clear from Belfast and elsewhere that insulating workers who handled traditional asbestos products in the course of their work have received larger doses of asbestos dust than formerly supposed. I would not accept the statement on p. 109, para. 1, 'and the degree of exposure of the workers studied was necessarily light as compared with miners, processers, and weavers in earlier times.' Insulation work as conducted on building sites, power stations, and shipbuilding contracts, is very dusty work in general terms. The dust produced in the process is very mixed and comes from all the materials used. While one of these is asbestos, which has been shown elsewhere to be linked with neoplasia in certain circumstances, the effect of all other dust ingredients in the lung has not been shown to be negative. The suggested synergism with cigarette smoking may or may not be proved in the paper but synergism with other materials is certainly a possibility. How far are the comparisons of mortality of the insulating group with that of the general white population of the U. S. valid? I had thought that, even in a small country like ours, there were differences between the lung cancer mortality of urban and rural dwellers. Surely in a large country like the U. S. these differences would be more marked, and there are comparatively large groups, like Seventh Day Adventists, who are non-smokers. New York and New Jersey are heavily industrialized and polluted areas. Would not the basis of comparison have been more realistic if averages for large industrial conurbations had been used? Some 283 insulation workers had a cigarette smoking history and stated mortality in relation to their occupation and smoking habits, whereas 87 insulation workers had a different mortality experience. In view of the disparity in the numbers concerned are we justified in regarding these as truly comparative groups? There were no non-smokers in the group of 87 workers: 48 never smoked regularly and 39 had smoked pipes or cigars, but never smoked cigarettes regularly (p. 107, para. 5). The number of necropsies performed on the group of 94 deaths was 41. This is a large proportion and I wonder if there is a problem here in view of the much lower necropsy rate in the 'expected' group. The statement made on p. 111, para. 2, that 'once exposure was reduced by improved industrial hygiene practice early deaths from asbestosis diminished and

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lung cancer became common,' was not our experience in Rochdale—rather the reverse. The figures presented from the Rochdale Factory (Ann. N. Y. Acad. Sci. 132, 526, 1965 and reviewed again in 1966 for publication) show that independent of smoking habits, which have remained substantially the same in the cohorts examined, there has been an improved mortality experience and a reduction in the incidence of lung cancer. While there may be some substance in the findings of this paper in relation to asbestos exposure, smoking, and neoplasia, I think it is not as great as these figures would have us believe. There are some statements made which seem slightly contradictory. We read (p. 110, para. 4) that 'exposure to asbestos dust does not increase the risk of bronchogenic cancer among men who never smoked regularly...we only conclude that exposure to asbestos dust (variety unspecified) does not greatly increase the risk of bronchogenic carcinoma among men who never smoke cigarettes regularly.' For comparison (p. 111, para. 9) 'this finding, being based upon the experience of only 87 men does not prove that asbestos dust (variety unspecified) has no influence on the risk of lung cancer among non-smokers. However, it suggests that exposure to asbestos dust does not lead to an extremely high rate of lung cancer among non-smokers.' " .

Another interesting difference in observations on Pathogenicity of Asbestos has occurred—this time in the IHF Research Laboratory. Dr. Gross has reported production of lung cancer in 31% of chrysotile asbestos exposed rats while other investigators have not reported successful production of lung cancer experimentally with chrysotile. Dr. Gross prepared his dust by hammermilling, while others using long-term exposures had not used this procedure. The mill hammers were badly worn in the process, and when analyzed (by Dr. Lewis J. Cralley, U. S. Public Health Service, Occupational Health Program), they were found to be high in trace metals, including nickel, chrome, cobalt and manganese; also, the dust was shown to have much higher trace metal content after milling. Follow-up studies in progress in the IHF Laboratory were described in IHF Medical Series Bulletin No. 11, "Asbestos Bioeffects Research for Industry"; these should help further identify conditions which may contribute to lung cancer production in man. As reported by Dr. L. J. Cralley in this Foundation Bulletin, the U. S. Public Health Service is working in cooperation with industry in an epidemiological survey to help identify conditions in textile manufacture which may produce hazardous contamination of asbestos fibers in order to provide a sound basis for industrial hygiene controls.

In this regard, U. S. Public Health Service researchers, L. J. Cralley, R. G. Keenan and J. R. Lynch, concluded in a recent paper ("Exposure to Metals in the Manufacture of Asbestos Textile Products," AIHA Journal 28:452-461, Sept.-Oct. 1967): "...the specific role of the asbestos fiber, per se, in relation to disease observed in asbestos workers needs redefining. Although asbestos fiber was considered in the past to be the primary etiologic agent, it may have been only an arbitrary index concealing a spectrum of undefined agents and relationships. Its role must be reassessed as a co-factor acting with other agents."

A series of letters to the editors of the American Medical Association's Archives of Pathology and the Journal of the American Medical Association (JAMA) were written by IHF researchers with regard to another difference of opinion resulting from a paper by J. G. Thompson, et al, of South Africa ("Asbestos as an Urban Air Contaminant," Arch. Path. 81:458-464, May 1966). The paper said that all pathologists now agree that asbestos bodies are produced only by asbestos exposure. The current issue of the Archives of Pathology contains an article from IHF by Dr. Gross, et al, entitled "Pulmonary Ferruginous Bodies, Development in Response to Filamentous Dusts and a Method of Isolation and Concentration" which makes this important observation:

> "Formation of ferruginous bodies should not be confused with pathogenicity. Failure to understand this differentiation may result in the erroneous generalization that all fibrous dusts share the ability of asbestos to produce lung damage. Such materials as fibrous aluminum silicate, silicon carbide whiskers, cosmetic talc, and glass fibers produce ferruginous bodies experimentally which are indistinguishable from those produced by asbestos fibers."

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The Transactions of the Foundation's 32nd Annual Meeting contain a paper presented by Dr. John M. G. Davis, University of Cambridge, entitled "Asbestos Bodies and Bioeffects—A Detective Story" which describes progress in studies which had been accomplished by IHF in collaboration with the University of Cambridge as well as the University of Pittsburgh, Mellon Institute of Carnegie-Mellon University and the U. S. Public Health Service. Based on Dr. Davis' paper, a letter to the editor of the JAMA entitled "Asbestos Bodies and Bioeffects" was published in the March 25, 1968 issue of that journal. This letter contained the following statement: "Wagner's mesothelioma cases were associated with the crocidolite areas and not with amosite or chrysotile. In other countries attempts to demonstrate that exposure to dusts other than crocidolite could produce mesotheliomas have so far been almost completely unsuccessful." In this regard, we have just received further information from Dr. Knox which qualifies the relative abilities of crocidolite and other forms of asbestos to produce mesotheliomas. The Ministry of Labour (in England) uses a phrase which is considered preferable to the above statement and is therefore offered herewith:

> "...The Advisory Panel considers that the evidence to date on balance indicates a particular significance must be given to crocidolite as a cause of mesotheliomas ...it cannot be concluded that only this type of fibre (crocidolite) is concerned with these tumours."

A supplementary letter has just been sent to JAMA including Dr. Knox's quote and pointing to still another important difference in findings which needs to be explained, i. e., Sluis-Cremer's reported findings of a high prevalence of mesothelioma in one crocidolite mining area of South Africa (Cape Blue) and not in another area (in the same country) in which both crocidolite and amosite are mined. There must be a factor, presently unknown, which accounts for these epidemiological differences, and we are presently working on the hypothesis that the major factor may not be the asbestos alone; as noted above, some impurity or associated substance may be most important. Hopefully, results of our studies, if positive, will provide needed guidance in developing and validating sound industrial hygiene control procedures.

IHF has been conducting a program of research in bioeffects of fibrous dusts of all types, in collaboration with universities, government, private institutions and industry, in humans as well as in animals, which will have cost over a million dollars by 1970. Other laboratories in the United States and abroad have even more costly programs of asbestos research under way. The importance of knowing in full the facts on asbestos hazards and controls and of applying these to the benefit of workers and the public has constituted an important aspect of the Foundation's mission for many years, and it obviously presents an important challenge to the entire field of Industrial Hygiene.

-- R. T. P. deTreville

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