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REFERENCES TO RECENT LITERATURE ON INDUSTRIAL DISEASE

Note on preceding abstracts: the following are obtainable from The Institution of Mining and Metallurgy, Salisbury House, Finsbury Circus, London, E.C.: Abst. no. 310, price 1 s. 6 d., no. 393, 1 s. 6 d.; no. 394, 1 s. nos. 158 and 159 in one pamphlet, 4 s.

(A) News Items:

420. OCCUPATIONAL DISEASE DISABILITY LEGISLATION. Survey of Labor Law Admin., Division of Labor Statistics, U. S. Dept. of Labor, May, 1937. Ind. Med. 6, 397-8 (June, 1937). Reprints obtainable from above address. Bills on some phase of occupational disease have been introduced in 23 legislatures. Laws have been enacted in Indiana and Washington, and bills have passed the legislature but have not yet received the governor's approval in Delaware, Nebraska, Ohio and Rhode Island. (The Ohio law, at least, has been signed, and has been discussed in an earlier abstract) Idaho, Maine, Montana, and Oregon have provided for committees to study the problem. New York has amended its law to provide for funeral expenses in silicosis cases. Provisions of each of these laws are given briefly.
421. WORK ON DUST CONTROL STANDARDS. Concrete (Cement Mill Ed.) 45, 202, (July, 1937). Standards of dust control practice are rapidly nearing completion by the engineering committee of the Dust Control Equipment Association. Theodore Hatch spoke at a meeting of the Association held at Cleveland, Ohio, on June 9, 1937 on the Importance of Modern Standards and Methods of Dust Analysis upon Design and Efficiency of Dust Control Equipment (which apparently covers the same ground as abstract 428).

(B). Papers on Dust, Dust Diseases and General Industrial Hygiene.

422. THE PNEUMONOKONIOSES (SILICOSIS), LITERATURE AND LAWS. BOOK 3. George G. Davis, Ella M. Salmonsens and Joseph L. Earlywine. Chicago Medical Press, 302 So. Canal St., Chicago, Ill. \$10.00. Obtainable from the publishers or booksellers. Of the 1033 pages of this volume, 321 are devoted to 701 abstracts of the literature on pneumoconiosis, dust prevention and associated subjects, which appeared in 1935 and 1936, including a number of news items and editorials, but mostly scientific papers. The abstracts of important articles are quite full, several pages often being given to one paper. We recommend this volume as a valuable extension of our abstracts back to 1935. Some of the 1936 literature on pneumoconiosis abstracted in our bulletins will be found treated more fully. A legal section of 131 pages summarizes recent state occupational disease legislation, with decisions in important cases. The book does not deal with industrial poisons or diseases not caused by dust.

The following papers which appeared in the June Industrial Medicine are among those given at the meetings reported in our July bulletin. In general they have not been reprinted, and they are obtainable only in Industrial Medicine for June, which can be ordered from Industrial Medicine, Inc., 844 Rush St., Chicago, for 50 cents. However, reprints of no. 413, in our August bulletin, are obtainable from the author.

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423. INDUSTRY AS A SOURCE OF DISEASE. Emery R. Hayhurst. Ind. Med. 6, 329-337 (June, 1937).

The writer begins by saying that industry means being busy and that health means a state of well-being so that it is an anomaly for industry to be a cause for ill-health. It is only when man's ability has over-stepped the threshold of "homeostasis" or the limit of endurance that he is susceptible to a given hazard. Some people are more susceptible than others; it is noticeable that in the most striking disasters 70-80% of those exposed, escape. A list of various hazards may be summarized in twelve words: dust, dirt, dampness, darkness, devitalizing air conditions, temperature, fatigue, infections, poisons, compressed air, stimulantism, susceptibility. Complaints on the part of workers, of headache, numbness, stiffness or sleeplessness are not diseases, but they are earmarks, and they should guide the industrial physician, as well as the engineer and chemist in seeking the elimination of possible industrial health hazards. Tables are given showing reports of occupational diseases in Ohio other than silicosis; a special table for silicosis, silicatosis and asbestosis for the years 1927-36 and a list of the industries involved is also given. The writer feels that more investigation is needed on silicosis with tuberculosis, for theoretically the two diseases should be antagonistic, but old evidence does not seem to show this. In a study of sandstone workers, 912 were examined; few under 25 years had silicosis, but at 34-44 there were as many silicotics in various stages as non-silicotics. Acute silicosis was reported as early as 1713. Recent outbreaks include the scourge to the American soldiers on the Mexican Border in 1915-1916, and the effects of recent dust storms. Often we have the paradox of a new agent method brought to the perfection of production for industrial purposes with no investigation of possible health hazard, and far too often employes are human guinea pigs in establishing the hazards that arise. In America organized labor leaves the health question pretty much to the individual. If it is hazardous to human life to produce an article of human usefulness, then the cost of production should include the cost of health protection. Industry should be a source of health and happiness and not a source of disease.

424. INDUSTRIAL HYGIENE LABORATORIES AND THEIR WORK. Gordon C. Harrold. Ind. Med. 6, 342-49 (June, 1937).

This paper treats of the laboratory and field work done in the investigation of industrial poisons and dusts, with special emphasis on lead. Recent developments in laboratory and field instruments are discussed. A method of calibration of the impinger and helpful details of procedure in its use are presented. The relative values of various instruments, especially the newer ones, are discussed. Procedures for estimating arsenic, cadmium, manganese and iodine are given briefly. Some unrelated subjects which involve some portion of the industrial hygiene laboratory's time are also considered, including noise, light and other conditions conducive to nervous disorders of workers, with mention of recent works in those fields. The study shows that the industrial hygiene laboratory is an implement for the industrial physician and engineer and a necessity for the investigation and control of industrial health hazards.

425. OCCUPATIONAL DISEASES AND THE GENERAL PRACTICE OF MEDICINE. Robert T. Legge. Ind. Med. 6, 352-358 (June, 1937).

During the last twenty years great advancement in knowledge of physical and synthetic chemistry has developed. New trades, new substances in manufacturing plant and the increasing number of chemicals used in industry, on the farm and in the home have increased morbidity due to toxic conditions. Therefore the industrial physician and the general practitioner must be constantly seeking a more thorough understanding of occupational diseases, toxicology, and the physiological and pathological changes found. Medical education standards in American schools have progressed, and the medical men entering fields of industrial medicine possess a keener insight for the pursuit of investigation. It is high time for the medical profession to think in terms of etiology of occupational disease in considering obscure cases not due to infectious causes. The greatest hazard attracting the

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obscure cases not due to infectious causes. The greatest hazard attracting the medical attention in industry at present is the one from solvents. The knowledge at present in the hands of the profession is far from adequate for a true diagnosis of how these poisonous agents act on organs and cells. Laws for occupational disease disability are important because through them exact information of cause and effect of industrial diseases may be obtained, and through this knowledge, remedies, control and preventive measures can be promoted. In lessening the incidence of occupational and degenerative diseases the general practice of medicine will become a still greater benefactor to mankind.

426. PRACTICAL METHODS FOR THE CONTROL OF HYGIENIC EXPOSURE. G. A. Coburn. Ind. Med. 6, 375-377 (June, 1937).
The writer gives various methods for good control of the dust and poison hazard in industry: (1) substitution of a safe material for a dangerous one; (2) substitution of a safer process; (3) prevention of the escape of toxic substances either through enclosure of equipment or power exhaust ventilation; (4) protective equipment for the worker; (5) proper hygienic care; (6) lower exposure by rotating workers; (7) selection of least susceptible workers for certain jobs. He gives as an example his company's plant, in which labor turnover was high before 1934 due to the high concentration of dust in the cast-iron machinery department, but since that time the company has instituted a practical dust-removing system and stricter hygienic laws so that at present this department is considered a very satisfactory place to work, and few transfers are requested from workers. In the storage battery department, involving a lead hazard, only a selected group is allowed to work and regular periodic analyses of the air and physical examinations of the workers are made. Similar improvement has been made in the chromium plating department by the installation of equipment of which the control of fumes is an integral part. Personal cleanliness and hygiene on the part of the worker is insisted upon throughout the plant, since it is one of the major factors in industrial disease prevention.
427. COMPENSATION FOR OCCUPATIONAL DISEASE. James A. Britton. Ind. Med. 6, 384-385 (June, 1937).
This paper is a broad and general discussion of compensation for occupational disease. Because the age tends to more and more industrialization, and certain diseases are the results of industry, such disabilities are a charge against production. Laws have been made to meet these charges, but the laws alone are not enough. Physicians must be educated to understand and diagnose correctly, and clinical opportunities should be given to internes to examine and study suspected cases of occupational disease. Engineers must have every facility for studying dangerous exposures and for experiments on the removal of the hazard or the best preventive methods. Industrial boards should have complete evidence in claims for compensation: (1) that there was an exposure; (2) that there is an occupational disease and how it is diagnosed; (3) that there is a disability; (4) that the disease is, or is not curable; (5) that the disability is temporary or permanent. The board cannot get this information unless their physician and engineer advisers can answer these questions. There are not enough doctors and plant engineers with training and experience in this field. Every medical school should have undergraduate instruction in occupational hazards and diseases. Every university should have occupational disease research in both medical and engineering departments because the big job of operating the laws satisfactorily will fall on the medical and engineering professions.

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428. PROGRESS IN INDUSTRIAL SANITATION, WITH SPECIAL REFERENCE TO THE CONTROL OF INDUSTRIAL DUST. Theodore Hatch, Associate Dust Control Engineer, Div. of Industrial Hygiene, New York State Dept. of Labor, 80 Centre St., N. Y. City. Am. J. Pub. Health 27, 671-679 (July, 1937). Reprints obtainable from author. Close cooperation between engineering, medical and chemical experts is necessary in order to solve industrial hygiene problems, especially that of estimating maximum permissible possible concentrations of toxic gases and dust, and of judging the efficiency of control by different methods and equipment. This paper indicates the progress that has been made in this direction in the field of dust diseases and the problems that are to be met. Three aspects of the problem must be considered; (1) measurement of dust concentration; (2) evaluation of the dust control program in terms of permissible dust concentrations, and (3) development of basic methods of design. The impinger has many good characteristics, but a real demand exists for a more convenient and rapid method. A high degree of accuracy is not important so long as the results are consistent among themselves. The purpose of dust determination is simply to obtain an index of the health hazard, and there is no high degree of correlation between dust concentration and degree of hazard. Failure to recognize this low degree of required accuracy has led to the unwarranted condemnation of certain methods. There has been much controversy on the respective merits of the so-called grab sample and the sample of large volume; however, when it is considered that years of daily exposure to dust is required to produce serious lung trouble, the difference disappears, and the konimeter, used in South Africa, has been found to yield results just as closely related to the degree of damage observed, as the impinger used in the United States. A large number of properly spaced dust determinations of low accuracy may be more valuable than a few samples of the highest quality. The difficulties of establishing the permissible standards are pointed out, and a table gives such recommended standards as have been obtained. Despite the uncertain value of any standard, there is need for practical criteria to be employed by governmental and other agencies. A single standard for each industry is preferable to a sliding scale depending upon composition of the dust, because there is usually no known definite correlation between composition and harmfulness, and because a sliding scale is too difficult to enforce. The remainder of the paper is devoted to the design of exhaust systems. They must be adapted to the particular dust and operation, and their efficiency may be increased by first preventing undue movement of the dust by the machinery itself. A mathematical discussion of air flow and particle movement is included, and fundamental specifications for the exhaust systems conclude the paper.
429. CHEMICAL AND PATHOLOGICAL STUDY OF PNEUMOCONIOSIS, WITH SPECIAL EMPHASIS ON SILICOSIS AND SILICOTUBERCULOSIS. H. C. Sweany, (M.D., Chicago Municipal Tuberculosis Sanatorium, Chicago, Ill.), J. D. Porsche and J. R. Douglass. Arch. Path. 22, 593-633 (1936). Reprints obtainable from author. This paper reports the results of chemical and pathological examinations of 40 patients, compared with those of 20 control patients. Nodulation is usually found in patients who have been exposed to silica dust and show a content of 0.2% of the weight of dried lung tissue, but there is no direct relation between the quantity of silica and either the time of exposure or extent of nodulation. Normally the silica content of the lymph nodes increases from about the same as that in the lungs in early life to about 0.6%. In cases of exposure to silica, the lung content gradually increases, exceeding the lymph node content and reaches nearly 2.5% in extreme cases. In workers in pure quartz there is little or no material other than silica, but in gran-

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ite workers, stonecutters, coal miners, molders and others the non-siliceous residue has a definite ratio to the amount of dust inhaled. Tuberculosis seems to be present in nearly all silicotics and seems to change the silicosis from a benign to a slowly progressive disease, with usually an acute and sudden termination. The lymph nodes usually undergo calcification in a form called "egg-shell". In coal miners the silica content of the lungs may become twice that at which silicotic nodules usually appear, without showing specific nodulation. The non-siliceous residue in coal miners is only slightly less than the silica content. Silicosis, tuberculosis and silico-tuberculosis are retarded by exposure to coal dust, sometimes resulting in the development of large black masses, larger and more benign than those of the tuberculo-silicotic complex. Uncomplicated anthracosis is generally free from nodular fibrosis, but is, nevertheless, of grave significance on account of predisposition of the patient to pneumonia and inflammation.

430. THE COMPENSATION ASPECT OF INDUSTRIAL HYGIENE. Wesley M. Graff. Am. J. Pub. Health 27, 667-70, (July, 1937). Copies obtainable from National Bureau of Casualty and Surety Underwriters, 1 Park Ave., New York City. In an address before the Industrial Hygiene section of the American Public Health Association, the author calls attention to the great cost of occupational diseases. In South Africa \$65,000,000 has been paid for compensation of silicosis alone, with an additional liability of \$34,000,000 outstanding. In some of our states the number of laborers is larger than in South Africa, and there are many occupational disease problems in addition to silicosis. In Massachusetts the compensation rate for stone cutting is now \$5 per \$100 of pay roll, plus an additional occupational disease hazard payment of \$300 per year for each employee. Statistics on compensation payments for several states are given. There is danger that compensation will become an unbearable expense to industry. The only remedy for that condition lies in prevention. A substantial reduction in compensation payments has been made in South Africa, and progress has been made in Ontario. The state health departments have an important part to play in controlling occupational disease. The Connecticut department, with eight years of experience, is cited as having made great progress, and the seventeen health departments recently organized will undoubtedly do much to relieve the situation.
431. DUST CONTROL, A CHALLENGE TO THE ENGINEER. Ralph R. Meigs, Nat. Safety News 36, 21-22, 68 (July, 1937). Wherever a great amount of fine material escapes into the air from a manufacturing process, something should be done about it. If the material is known to contain silica, there is undoubted need for dust control. The absence of visible dust does not indicate that there is no hazard; often dust generated at a place where only two men are working may contaminate an entire workroom where twenty or more persons are working on non-dusty operations. The dust control problem is principally an engineering one, and the demand at present for dust control finds the engineer tackling problems never before faced. He is a pioneer and is therefore free to select or try any method he thinks feasible provided he does not violate conventional standard practices. One of the first things for the engineer to do is to look into the housekeeping. This, at a glance might not seem to be his job, but it is. Housekeeping in a plant is often a hit-and-miss affair, and there are countless alibis for poor housekeeping. Part of the housekeeping problem consists of the condition of the floors, congested arrangements, defective apparatus, leaks and spillages. A considerable portion of dust exposure is due to these sloppy housekeeping conditions. When a system of dust control is installed, the engineer must watch constantly to see that it is not neglected. A properly designed exhaust system is a delicate apparatus, and the engineer should be its guardian.

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432. A REPORT OF A SURVEY OF CERTAIN INDUSTRIES IN NORTH CAROLINA INVOLVING A SILICEOUS DUST HAZARD. H. F. Eason and M. F. Trice. Div. Indust. Hyg., State Board of Health and North Carolina Industrial Commission, Raleigh, N.C. (July, 1936). Obtainable from these departments, but we have no information on price.

This interesting survey contains a graphic map of North Carolina, showing the distribution of the mining industries (mica, feldspar, kaolin, gold, granite, talc and copper). The preparation for such an investigation and the procedure carried out in the plants are outlined. Statistical tables are presented, showing the distribution of workers in the industries, percentages exposed to dust hazards, industrial welfare provisions and a full analysis of the asbestos textile industry. The results of the survey show that 25% of the state's population are engaged in manufacturing, mechanical and mineral industries; that welfare activities are supported by 20% of the industries involved; that only a small percentage share in sick-benefit or group life insurance; that first aid is available in only 20% of the plants; that 55% of all workers included in the survey are exposed to siliceous dust hazards, and 75% of the workers in the asbestos industries are similarly exposed; that only 25% of all the workers in these dusty trades are protected by dust-controlling apparatus, and that flagrant practices such as sandblasting in open workrooms are reported as common practice.

433. METHODS FOR CONTROLLING THE DUST HAZARD. A. I. Brandt, Sc. D., Willson Products Co., Reading, Pa. Metal Cleaning and Finishing 2, 281-8 (April, 1937). Reprints are not obtainable, but the author or company will send information covering the material.

The important methods for controlling the dust hazard are given as follows: (1) control of harmful material at the source; (2) isolation of hazardous processes; (3) substitution of non-hazardous processes, and (4) reduction of dusts in inspired air by respiratory protective devices. The first heading is subdivided into (1) the use of water or other suitable liquids, (2) the use of properly designed local exhaust equipment, and (3) good local housekeeping. Each of these subjects is treated briefly, as are also the second and third main headings. Most attention is given to respirators, their requirements, inspection, effectiveness, and types, including mechanical filter, chemical filter, and supplied air for abrasive blasting.

434. A CLINICAL AND RADIOLOGICAL EXAMINATION OF WORKERS EXPOSED TO ALUMINA DUST. REPORT BY THE INDUSTRIAL PULMONARY DISEASE COMMITTEE OF THE MEDICAL RESEARCH COUNCIL. Lancet 11, 1478-1480 (Dec. 19, 1936) also Brit. Med. J. 1273-4 (Dec. 19, 1936).

Powdered flint in the manufacture of china biscuit ware has been the chief cause of silicosis in the pottery industry. As a substitute for flint, experiments were made with alumina. This was satisfactory to the industry, but the question was, what risks of pneumoconiosis there were to the worker. Men working on reduction furnaces in the manufacture of aluminum were exposed to alumina dust, and an investigation was made on fifty men working in the reduction factory of the British Aluminium Co. These men had worked from five to forty years, and those who had been exposed to harmful dusts in previous occupations were not included. No clinical or radiological changes were found, with the exception of those who had previous histories of pneumonia, chronic bronchitis, asthma, etc. Within the limits of this investigation the committee could not find any evidence that inhalation of alumina dust caused fibrosis of the lungs. Dr. Bradford Hill gives a report of sickness in the whole factory for a five-year period. While the sickness rates were slightly higher in the reduction works than in other parts of the factory, there were no real differences between the kinds of sickness. An investigation was made of dust clouds consisting of alumina, with small proportions of aluminum,

sodium fluorides, sodium oxides and cryolite. Dust counts included all particles seen as resolved entities down to about 0.25 micron. Records were taken at one factory from the thermal precipitator worn by furnace workers. These ranged from 1020 to 2430 particles per cc. and the general air of the furnace room samples varied from 410 to 655 particles per cc. (1 particle per cc. is equivalent to 28,300 particles per cubic foot, or 35 particles per cc. equal 1 million particles per cu. ft.) Men emptying sacks of alumina in the furnace room were exposed to concentrations of 1510 to 1580 particles per cc. At other factories similar results were obtained. The median size of particles are given as 0.23 microns to 0.5.

435. PULMONARY TUBERCULOSIS IN INDUSTRY. INCIDENCE AND AFTER-HISTORY. AN ANALYSIS OF 3,755 CASES. H. H. Bashford and W. L. Scott. Lancet 1115-1116 (Nov. 7, 1936).

This article refers to the regular staff of 156,000 men and women employees of the General Post Office in England with ages ranging from 16-60 years, and all physically examined before being employed. Between 1914 and 1935, incidence of pulmonary tuberculosis varied, being sometimes higher, sometimes lower than that of the whole population of England and Wales. Incidence in 1935 (1.04 per 1000) compares with 1920-1935 figures of 1.55 per 1000 for London Post Office employees and 1.43 for those in the provinces. During the same period, the rate for manual workers in the general population in London and mostly outdoors, was 1.92 and 1.56 for the provinces. The authors' conclusion is: (1) that only about 50% of those who develop pulmonary tuberculosis are able to return to work; (2) of those who return, a further wastage of 48% for various forms of ill-health has resulted; (3) that light manual and clerical indoor workers have a slight advantage over manual, outdoor workers and a 10% advantage in respect of subsequent survival in industry after resumption of work; (4) of cured and arrested cases who survive a period of 10 years, the wastage due to various ailments, including recurrent pulmonary tuberculosis, at the end of an additional five years is reduced to about 14%.

436. MINE WORKERS' PROTECTIVE EQUIPMENT. H. M. Audspeth. Iron and Coal Trades Rev. 134, 100 (Jan. 15, 1937).

In England about 130,000 non-fatal accidents occur in the mines every year, and 75,000 of these affect the parts of the body that can be most easily safeguarded. These are the head, hand, foot and eye, for which the hard hat, gloves, safety boots, goggles and other modern protective equipment for mine workers is so widely known. A general adoption of protective equipment is imperative, not only from the humanitarian viewpoint but from the question of the cost to industry, in lost production, broken equipment, reduced efficiency and overhead charges. Compensation paid in 1935 for all accidents was two and a half million pounds, and by the use of such equipment much of this could be saved.

437. SILICOSIS. P. H. Pierson, M.D., Dept. of Medicine, Stanford University, San Francisco, Calif. Cal. & West. Med. 45, 477 (Dec. '36). Reprints obtainable from author.

The author gives four reasons for the development of the silicosis "racket", including the increasing industrial uses of silica and silicates, more widespread appreciation of the presence of dust diseases, labor unrest and readiness of unscrupulous lawyers and doctors to plead and testify on presumptive knowledge. The importance of silicosis as an industrial problem, with special reference to California, is pointed out, and the medical problem is also considered. In discussing the solution of the problem, the nature of the dust hazard is considered, and the necessary data to be obtained are listed. Two cases are given in which insufficient knowledge of underlying conditions led to

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error. The author advocates surveys in all dusty industries. The paper closes with a brief account of the author's survey of an asbestos factory, with a tabulation of industrial and clinical data.

438. DUST ALLAYMENT DURING SHOTFIRING. A. Nelson. Colliery Guardian 155, 1-2, (July 2, 1937).
The dust hazard from the drivage of hard headings is considered one of the most dangerous underground. The author describes here various tests made with the heading sprayed, - with water, with water containing soda solution, and with water containing a soft soap solution, also a dry test. The Hay mist projector was used for spraying and the Zeiss konimeter for dust tests. Dust samples were collected dry and before and after spraying. The testing ground consisted of massive sandstone. Tables are given showing the samples taken, dust count and time-interval before and after firing. The dust produced after dry firing was very dense. It was an hour before it cleared to a countable and safe working condition. This means a loss of work time. The Hay projector was very efficient; the mist spray resembled condensing steam, and the atmosphere in the face of the heading was refreshing. A period of spraying before shotfiring will damp the existing floatable dust and prevent its agitation into suspension by the shot-firing concussion. Improvement in hygienic conditions and economy in work time is effected by the use of a mist projector; another important precaution to be observed regarding the dust problem in hard headings is to inculcate a dust consciousness in the heading men and shotsmen in charge. They can contribute considerably to healthier conditions by exercising care in placing of shot-holes, in using the correct amount of explosive, and in the use of good stemming materials.
439. ROYAL COMMISSION ON SAFETY IN COAL MINES, TESTIMONY OF MINeworkERS' FEDERATION OF GREAT BRITAIN. Colliery Guardian 154, 58-59 (Jan. 8, 1937).
Machine or intensive mining gives rise to additional dangers in the opinion of the Mineworkers Federation. Stricter observance of regulations, more adequate control by inspectors, managers, and their assistants, and increasing the number and the powers of the workmen's inspectors will overcome many of these dangers, the chief of which are: (a) the difficulties of roof control caused by the rapidly advancing coal face; (b) the increased quantities of gas given off at the coal face per unit of time; (c) the increased accumulations of coal dust at the face, at conveyor ends and on the roadways; (d) the increased friction surface for the ventilating currents; (e) the loss of audibility and visibility by the workmen and (f) the dangers from the increase of shotfiring and the extended use of electricity. Changes in mining practice constitute the solution to certain dangers, and these changes would involve, in some cases, changes or additions to the existing law.
440. NATURE OF THE SILICA FOUND IN LIVING ORGANISMS: SILICA OF CONSTITUTION AND OF INTERPOSITION. E. Kahane and G. Antoine. Bull. soc. chim. biol. (French) 1769-1782 and 1783-1788 (1936).
The spicules of the siliceous sponges, the tabashirs or siliceous concretions found in the nodes of bamboo stems and the shells of diatoms consist of amorphous silica and are metabolic products of the organisms. The silica left after destruction of organic matter by digestion with hot perchloric acid gives the x-ray diffraction diagram of an amorphous substance and is readily soluble in concentrated sodium hydroxide solution. To distinguish this silica from crystalline silica derived from dust, the authors call the former "silica of constitution" and the latter "silica of interposition".

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441. FURTHER INVESTIGATIONS OF SILICOSIS IN AUSTRIA. J. Adler-Herzmark and G. Kopstein. Wien. med. Wchnschr. (German) 87, 433-441 (1937). During the years 1931-1935, 295 cases of pneumoconiosis were investigated on men employed in various industries. Severe cases were found in the quartz mines, in casting polishers and sandblasters, in porcelain workers and in the manufacture of scouring powders, and also with those who worked with carborundum wheels. Light or negative cases were found among ceramic workers, sanddressers and mixers in foundries, among those who worked in the production of quartz tubes and vessels and workers with siliceous earth. The report is illustrated with short tables.
442. LUNG DISEASES OF COAL MINERS. A. Feil. Presse méd. (French) 591-93 (1937). Lung diseases of miners are discussed, including common diseases, bronchitis and lung inflammation. A bronchitis aggravated by coal dust that results in emphysema should be considered as an authentic industrial disease. If tuberculosis or syphilis is not present, lung fibrosis of coal miners is caused by a mixture of silica in the coal dust, and chronic bronchitis and alcoholism hasten its development. The incidence varies in different countries. In the quartz district of Gard, France, silicosis is common, but in Nord and Pas-de-Calais it is scarcely known, because little quartz is found there. In explaining conditions the author makes various suggestions and believes that carbon has a specific action.
443. DISEASE CAUSED BY THOMAS SLAG DUST IN PORTS AND PREVENTIVE MEASURES. E. Holstein and O. Mau. Arbeitsschutz (German) 99-104 (1937). In the autumn of 1935 and summer of 1936 respiratory diseases increased among workers who unloaded Thomas slag dust in Königsberg harbor. There were severe bronchitis and 11 pneumonia cases, 6 of which were fatal. One of the sick men had worked only one day and for the first time with Thomas slag dust. However, acclimatization does not prove immunity, for some workers with long experience with the material have been affected. The causes for this increased incidence were investigated and found to be: use of weak and unsuitable workers for hard labor, overexertion because of too long a workday, increased importation of the material at this port, unsuitable sacks, etc. The authors energetically handled the situation and have made a number of changes, among which they forbade alcohol and smoking and give two litres of milk to each man; have medical examinations and supervision.
- (C) Papers on industrial poisons, dermatitis, etc.
444. THE ATMOSPHERIC CONTENT OF LEAD. Carey P. McCord, Herbert T. Walworth, Jan Johnson and Philip E. Fisher. Ind. Med. 6, 357-361 (June, 1937). (See note preceding abstr. 423). As a rule the chief exposures of lead are from the manipulation of dry lead oxides, preparation of grid paste, application of paste to lead grids and the cleaning and inspection of plates prior to forming. Generally the extent of exposure depends on the size of the plant. Most large establishments have introduced protective measures, and in such places clinical lead poisoning is rare. It is in the small plants where exposure is great, where no facilities for bathing, meals and change of clothing are to be found, and often circumstances are such that no monetary responsibility can be laid upon the small employer. The study that the authors made of these smaller plants was divided as follows: (1) engineering survey; (2) collection of air samples and determination of lead concentration; (3) collection of blood specimens of all employees working at the time of the visit. Although it is believed that exposures differ with the various processes, it was difficult to decide this point because all processes were carried out in the same room. Tables are given of the atmospheric lead determinations and corresponding basophilic

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aggregation cell counts of workers exposed and persons unexposed to lead. Not all workers showed the same response to tests. This might be due to the tolerance of the worker, the manner in which the worker manipulates tools or the variations in different workers regarding cleanliness, change of garments, etc. Statements are frequently made that there is no known tolerance to the action of lead, but from this survey it is quite apparent that equal exposures do not present uniform lead poisoning on all those working under similar conditions.

445. DIVERTICULOSIS OF COLON, PARTICULARLY AFTER LEAD POISONING. J. Hartmann. Munch. med. Wchnschr. (German) 84, 252 (Feb. 12, 1937).
The author describes two cases showing that late intestinal symptoms may be manifestation of diverticulitis and colitis, and these may be the probable result of an earlier lead intoxication. Persons who have had lead poisoning often complain in after years of chronic constipation, digestive disturbances and colic; and if they do not exhibit signs of late sequels of lead intoxication, the connection between intestinal disorder and lead poisoning is usually rejected. In this paper the author considers the subject of chronic spastic constipation as the cause of diverticula and their occurrence in lead poisoning. In one of the cases referred to above, examination revealed colitis and diverticulitis, and in the other diverticulitis of the transverse colon. Both patients had histories of lead poisoning and of chronic spastic constipation. The author feels justified in assuming a connection between: lead intoxication and constipation and between lead intoxication and formation of diverticula.
446. STUDY OF CHRONAXIE IN LEAD POISONED PRINTERS. K. Kuroda. Nagoya J. M. Sci. 10, 89-96 (1936).
An investigation was made on the sensitivity of the extensor digitorum communis muscle to electric stimulation of 606 men and 76 women printers. Abnormal chronaxie was found in 397, and as exposure to lead absorption increased, it was still more prevalent. The right side was more likely to suffer than the left. The chronaxie test was found to be more reliable than blood tests for lead content or for the presence of punctuate basophilia. It is superior and easier to carry out for first diagnosis. High percentage of abnormal chronaxie was found in those who did not take hot baths very frequently; also the percentage was unduly high in those workers addicted to drinking or smoking. This was true also for syphilitics.
LL. The Influence of Thiosulfate
447. URINARY EXCRETION OF ARSENIC. I. NORMAL SUBJECTS. J. R. Mattice and D. Weisman. Am. J. Med. Sci. 193, 413-423, (Mar., 1937).
Casual specimens are not satisfactory for study of urinary arsenic excretion and figures have no meaning unless the diet is known. On an average diet, a normal individual's urinary arsenic excretion fluctuates from day to day. In the 163 subjects examined, the fluctuations were from negative (18%) to 0.85 mg. of arsenic (elementary) per diem with the mean at 0.25 mg. In 48 subjects an arsenic low diet decreased the urinary elimination; they ranged from negative (62%) to 0.2 mg. arsenic per diem with the mean at 0.07 mg. Only with a standardized chemical procedure for the detection of arsenic can results of urinary arsenic excretion studies be interpreted. Only under conditions that control the ingestion of arsenic is it possible to study the effect of thio-sulfate upon the excretion of arsenic. An intravenous administration of thio-sulfate will not increase the elimination; it tends rather to decrease it both on the day and subsequently.
448. DETERMINATION OF SMALL AMOUNTS OF ARSENIC IN BIOLOGICAL MATERIAL. K. Hinsberg and M. Kiese. Biochem. Z. 290, 39-43 (1937).
This is a description of a colorimetric method in a small apparatus.

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449. INDUSTRIAL ARSINE POISONING. H. Garmsen. Samm. Vergift. (German) 8, 67-70, (1937).

After about three hours' handling of a lye waste that consisted of a solution of silicic acid and sodium fluoride, two workers fell ill with exhaustion and hematuria. The typical picture of phosphorus-arsine poisoning appeared in both men causing death to one. Six weeks after the poisoning the surviving man's blood pressure was still 180-105 but dropped to normal some time later.

450. SICKNESS DUE TO CHROMIUM. THE PROTECTION OF WORKERS MAKING OR USING CHROMIUM SALTS. Leroux-Robert. Bull. Acad. Med. (French) 116, 875-882 (1936).

This study was made under direction of the French Minister of Labor in Jugoslavian, Czechoslovakian and Rumanian factories in the chromium salt manufacturing industry. These salts are very toxic, although the metal itself is not harmful. The industries concerned are: electrolytic chromium plating, manufacture of colors, as lead chromate, chrome tanning of skins, certain dyes, sporting powders, photography and the manufacture of Swedish matches. When dust is generated, the nasal mucous membrane is attached; if the skin comes in contact with these substances, eczema develops, and if there is an abrasion on the affected part, painful ulcers form, as in the mucous membrane of the nasal cavities. In the countries named adequate care is taken to protect workers. Protection lies in strict cleanliness, wearing gloves, well-planned ventilation to remove dust and fumes. Workers should be warned of the risks, for preventive measures should be obligatory upon both master and man.

451. LIVER DAMAGE FROM THE CHRONIC ACTION OF METALS. D. G. Tallenberg. Z. klin. Med. (German) 132, 115-119 (1937).

Functional disturbances of the liver were found in an examination of workers in metal foundries and in 80 welders who had been exposed to metal fumes. These disturbances are considered early symptoms, but only further investigation will show whether they will develop into some form of disease. The author had previously made a report on liver damage in mercury workers.

452. CARBON MONOXIDE POISONING - SYNDROME OF THE PARIETO-OCCIPITAL REGION AND SYMPTOMATIC EPILEPSY. H. Scheller. Samm. Vergift. (German) 8, 77-78 (1937).

A 14 year old boy with a fractured leg was brought to the hospital in an ambulance heated with exhaust gas. It was the first time that the heater was used. The boy and his attendant both lost consciousness. The boy complained of double vision and headache and became very agitated. The fracture was set under a short ether anesthetic, and four days later severe psychic disturbances developed. He had difficulty in recognizing his surroundings, hallucinations, optic disturbances, numbness and trouble in counting. Two years later he was again carefully examined, but there were still apraxial and optical disturbances. Another accident 6 months after this examination developed repeated epileptical attacks at increasing intervals, showing an injury to the parieto-occipital region.

453. THE ELECTROCARDIOGRAM IN CARBON MONOXIDE POISONING. B. Steinmann. Z. Kreislaufforsch. (German) 29, 281-299 (1937).

The hearts of 30 patients who suffered with light or severe monoxide poisoning were examined clinically and electrocardiographically by the author. Nearly all patients were below thirty years of age, and clinically detectable enlargement of the heart was nearly always absent. In only one case could he determine anginosis, and only one of lowered blood pressure. The latter ended fatally. In 21 cases the electrocardiogram showed myocardial damage of a light to a severe degree, but there was no connection between the severity of the poisoning and the electrocardiographic picture. In only one case a chronic myocardial lesion was seen. The electrocardiographic changes returned to normal in the cases that took a favorable turn. No doubt the reversible changes result from anoxia of the heart-muscles, while the rarer symptoms are caused by hemorrhage.

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REFERENCES TO RECENT LITERATURE - 12

454. RESORPTION OF CARBON DIOXIDE AND HYDROGEN SULFIDE THROUGH THE SKIN. C. Schmid. Arch. internat. de Pharmacodynam. et de Therap. (French) 55, 318-330 (1937). Carbon dioxide and hydrogen sulfide in aqueous solution were put in tubes, of which the open ends were applied to the skin. The carbon dioxide and hydrogen sulfide contents were measured before and after the experiment, and the difference was taken as the amount resorbed by the skin.
455. ON THE RESORPTION OF CARBON DIOXIDE FROM SALT SOLUTION AND THROUGH THE SKIN. G. Lehmann. Arch. internat. de Pharmacodynam. et de Therap. (French) 55, 331-46 (1937). Using the same method, as Schmid, the author determined whether or not carbon dioxide diffuses from salt solution. Diffusion takes place and decreases with an increase in salt concentration.
456. CYANOSIS OF THE EXTREMITIES FROM SEVERE CARBON DIOXIDE POISONING AND PROLONGED ANOXEMIA? H. Täger. Samml. Vergift. (German) 8, (Gutachten), 19-30 (1937). A man 22 years of age working in a green fodder silo in June, 1935, developed a severe gas poisoning. After a two months' absence, he returned to work. His hand and lower arm turned blue, as did the feet later on. The ganglion coeliacum was removed, and two months later there was an attack of tetany. The case was considered for compensation, and the question arose as to which gas was responsible. The author concluded that it was the anoxemia in particular that caused these late results, as the effects of carbon dioxide poisoning pass quickly. Some symptoms were of a purely neurotic nature.
457. POISONOUS AND HAZARDOUS GASES ON SHIPS. J. Winter. Arbeitsschutz (German) 104-105 (1937). Men working in a freight hold containing dry ice in New York Harbor were overcome by carbon dioxide from evaporation. Only three of the eight persons afflicted could be revived. A man in Hamburg entered an empty oil storage tank and became unconscious from oxygen lack. Another who went to his rescue also became unconscious. When they were taken out, the first one revived, but the second one died. Two ship engineers investigating a false bottom feed water tank became unconscious, and one died. The author makes his report from news items in the press.
458. SEVERE OCCUPATIONAL ACCIDENTS WORTHY OF ATTENTION. L. Teissl. Ztb. f. Gewerbehyg. (German) 23, 236-240 (Oct. 1936). There are many serious hazards to which maintenance workers are subjected that are difficult to foresee or guard against. In construction operations, transportation, elevator and crane operation, in the field of electrical transmission and in repair of machines, accidents occur frequently. There are thirty severe accidents described, some taken from the Austrian Factory Inspection Department's annual reports. Among them are three cases of gas poisoning, 16 persons involved with 7 fatalities, and a group of accidents in construction and demolition and other diverse operations. A suggestion is made that machinery be frequently inspected so as to insure safety in the plant and prevention of injury.

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REFERENCES TO RECENT LITERATURE.- 13

459. GAS WORKS AND INDUSTRIAL DISEASES. R. Barthe. Presse med. (French) 579-580 (1937).
Exposed workers are examined periodically so that suspicious cases are detected (there are 2 to 3 yearly). The author discusses diseases that have occurred in the past few years. He has never seen chronic carbon monoxide poisoning of a definite character. From 1924-32, 25 moderately acute carbon monoxide cases were seen, but after a technical change was made, these became very rare. Benzene poisoning was not discovered. Despite a great amount of dust in the coke pulverizing plant, x-ray examinations show no dust diseases. The coke contains only a small amount of silica. Tar cancer has never been seen. Tar acne was seen, and burns were numerous. Conjunctivitis is common, and there are sporadic cases of dermatosis. Slight general disturbances might be caused by hydrocarbons.
460. RAPID DETERMINATION OF SULFUR DIOXIDE IN AIR. D. N. Finkelstein. J. Applied Chem. (Russian) 2, 1347 (1936).
An investigation was made of existing methods of sulfur dioxide determination. The colorimetric determination can be carried out on a 10 cc. sample, with a sulfate ion content of 0.05-0.50 mg. The influence of potassium chlorate upon the coloration of the chromate solutions should be determined, and series of standard solutions with a concentration interval of 0.05 mg. should be used. For the determination of oxidized sulfur dioxide up to a concentration of 0.005 mg. the iodometric and alkalimetric methods are adaptable. A manually-operated pump was used for sampling air.
461. THE DETERMINATION OF TRACES OF GASEOUS HYDROCYANIC ACID. A. Sieverts and K. Rehm. Angew. Chem. (German) 50, 88, (1937).
Within wide limits, the determination of gas traces by means of benzidine cupriacetate is independent of the copper and benzidine-salt contents of the test solution. Test conditions, such as temperature, small variations in weighing and mixing, and the acetic acid content of the acetate are unimportant. It is important to ascertain the color shade immediately after the test. Procedure for preparation of test solutions and experimental results are given.
462. QUANTITATIVE DETERMINATION OF HYDROCYANIC ACID. K. O. Moeller and K. Stefansson. Biochem. Z. (German) 290, 44-57 (1937).
The Schulek-Lang iodometric, colorimetric and step-photometric methods were re-examined and approved. A special procedure is suggested for the last one.
463. GAS DETECTORS FOR DETERMINATION OF FLAMMABILITY, OXYGEN DEFICIENCY AND TOXICITY IN ROOMS AND VESSELS. E. W. Gilliland and W. P. Yant. Trans 25th Natl. Safety Congr. 229-240, (1936). No information as yet about reprints.
Chemical, physicochemical and physiological methods and instruments for detecting and determining contaminants in air are discussed. The greater the difference between weight of air and weight of gas or vapor, the easier it is to determine their presence by measurement of the physical properties.
464. THE NEW DRAGER OXYGEN-BREATHING APPARATUS, MODEL 210. F. Hallmann. Dräger-Hefte (German) No. 187, 3331-3336 (1936).
The mechanical construction of this new small-size apparatus, put on the market late in 1936, is explained in detail. Numerous photographs and sketches are given with a detailed sketch of the oxygen-distributing valve.
465. LACQUER DISEASE. H. Bonnin and André. Gaz. Méd. de France 43, 15 (1936).
Dermatitis from the use of Asiatic lacquer has been known for a long time in China and Japan. The lacquers are dried sap from trees of the Rhus genus, and the whole Rhus genus is toxic. Some persons are not affected, but others

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develop an eruption on the exposed skin, distress follows and an irritating erythema with vesicles appears. There may be swellings on the face and eyelids, or nephritis. In rare cases there are convulsions and heavy breathing and more rarely still a fatal issue. The breath is strong and aromatic. The lesions are benign and disappear after a few days. The lacquer is taken from the trees in the same way as rubber is. Three toxic substances are found in it; uroshiel, laccol, thitsiol. The treatment is simply removing the patient from the source of trouble and applying soothing applications. Protection is attained by observing strict cleanliness and wearing gloves.

466. SAFETY IN SOLVENT EXTRACTION. B. Bonotto. Oil and Soap 14, 30-33 (1937). Some of the precautions recommended are : differences of voltage between sections of pipe lines or machines should be avoided; pipings handling solvents should be welded; compressed air in pipe lines generates static electricity and should not be used, and metallic moving parts that could cause sparks should be made of brass, bronze or copper. The sewer connecting the building to the main sewer should be trapped many times before it reaches the main to prevent escape of solvents. There should be no U bends in pipes handling solvents. Solvent spilled on the floor should be diluted with carbon tetrachloride from pint bottles kept for that purpose. Continuous extraction is preferable, as there is no periodical opening and closing of extractors. Although, as a fire preventive, carbon tetrachloride is useful, the effects of it on man should not be overlooked.
467. BENZENE POISONING IN THE MANUFACTURE OF MIRRORS. D. Glibert. Brux. med., (French) 17, 779-83 (1937). The work of women in the production of silvered mirrors consists of first covering the silver with a varnish containing rubber and alcohol and then with a coat of rubber resin in a benzene solution. From this occupation the author reports 6 cases of poisoning with 3 deaths, and at the time of writing one case is in a very grave condition. Bilateral blocking of the nipples, marked blood changes and optic nerve atrophy in the left eye developed in one woman causing her to lose ground. The use of benzene should be abandoned in this work. Other necessary changes include automatic lacquering in closed containers and medical supervision.
468. THE ACTION OF DICHLORODIFLUOROMETHANE ON THE NERVOUS SYSTEM OF THE CAT. C. Brenner. J. Pharmacol. 52, 176-181 (1937). Tremors following the inhalation of dichlorodifluoromethane are not due to convulsant poisoning. Dichlorodifluoromethane is a depressant of low toxicity affecting the central nervous system and the tremors are due to release phenomena from its action on the regulatory motor centres.
469. APPLICABILITY OF THE ELECTROFILTER IN PROTECTION AGAINST WAR GASES. A. Schleicher and R. Koester. Gasschutz u. Luftschutz (German) 7, 22-23 (1937). To determine whether an electrofilter could be used in a collective protector, some experiments were undertaken. The completeness of the filtration was dependent upon the temperature, the controllable factors of voltage and velocity of air stream, the volatility of the substance, its stability in the electric field and in the presence of ozone which is always present in these discharges. Diphenylchloroarsine precipitated completely in a liquid condition at a temperature of 40°. It was oxidized to the extent of 70%. Mustard gas was not completely precipitated, although the wall of the filter was covered with a solid decomposition product. Because it was believed that behaviour of other war gases could be predicted from their chemical compounds, they were not investigated.

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470. MORE PSYCHOLOGICAL ACCIDENT PREVENTION^o Schuermann. Ztb. f. Gewerbehyg. (German) 23, 241,242 (Oct. 1936).
In most cases the greatest number of occupational accidents are the result of the personal factor and are preventable. The best method to prevent accidents is to educate the worker in giving as much attention to safety as he does to proper conduct of his work. The engineer has succeeded in safeguarding machines and there is a decrease in such accidents. In occupational accidents there are between 7,000-8,000 fatalities yearly, about 1,500 permanent disabilities and about 120,000 temporary injuries. 70% of these are considered preventable. New employees, those who have been out of work for a long time and young workers should be instructed, and posters are a means to this end. Statistics are given of decrease in accident rates where safety engineers are employed and technical accident prevention has reached a high level. Now safety engineers should carry on the psychological accident prevention and bring it to as high a level as the technical accident prevention. A tendency to become involved in accidents is the result of bodily defects as mental characteristics and psychological accident prevention has an important problem in the choosing of workers. (Although this paper deals with physical accidents, the psychological factor is equally important in dealing with occupational hazards)
471. CHEMICAL COMPOUNDS AS CARCINOGENIC AGENTS. J. W. Cook and others. Am. J. Cancer 29, 219-59 (1937).
A full survey of the carcinogenic chemicals, dealing with their chemical relationships and their biologic effects is presented by Cook and his colleagues. They bring together all the material published up to the end of 1936, under appropriate headings. Included in their survey are the hydrocarbons of the benzanthraccene type and also the azo compounds, estrin, the styryl quinoline derivative discovered by Browning, et al, as well as the inorganic compounds, zinc chloride and arsenic. Appended is a bibliography of 194 references.
472. DERMATITIS FROM PHENYLHYDRAZINE COMPOUNDS. J. G. Downing. New Engl. J. Med. 216, 240 (Feb. 11, 1937).
In a rubber mill a twenty-five year old worker mixed raw and reclaimed rubber with chemicals and shoveled the mixture into a machine. He worked for 14 months with no ill effects. Then a new material was introduced, a compound of zinc chloride and phenylhydrazine. After handling this material twice, his eyelid swelled, his eye became bloodshot, and an itchy rash appeared on hands and arms. The trouble returned the next time he handled the material, and he experienced a burning of the tongue, a loss of sense of taste and a hard, dry cough. Wet and dry patch tests were made. The first produced an area of erythema and edema, the second a very red and edematous skin covered with tiny vesicles. The nature of the reaction was impetiginous.
473. OCCUPATIONAL DERMATOSES IN RELATION TO COMPENSATION. Robert C. Jamieson. Ind. Med. 6, 378-381, (June, 1937). (See note preceding abst. 423).
A quotation, taken from a treatise written nearly two hundred years ago, is, that every sick person should be asked by his physician, "What trade he is of?"
In the field of occupational dermatoses of today, this question is probably of more importance now than it was then; because of the tremendous increase in occupations, reported as productive of dermatitis. It is generally agreed among dermatologists and also by their patients that dermatitis should be compensable. So the question arises, should occupational dermatoses be classed as a compensable occupational disease and be paid for as other occupational diseases; how should it be judged and on whom should the burden of proof rest.