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REFERENCES TO RECENT LITERATURE ON INDUSTRIAL DISEASES

(A) News Items

- 338 PROGRESS OF STATE MINIMUM-WAGE LEGISLATION, 1937. L. Stitt and F. P. Smith. U.S. Monthly Lab. Rev. 46, 194-204 (Jan. 1938).
Following the Supreme Court decision upholding the constitutionality of the Minimum Wage Act of Washington, great expansion in legislation setting standards of minimum wages and maximum hours for women and minors has occurred. At the end of 1937, Minimum Wage Acts were in force in 22 states, the District of Columbia and Puerto Rico.
- 339 PROTECTION OF WORKERS IN SANDBLASTING. Arbeitsschutz, 48 (1938). German.
This short account of a meeting of the sandblasting committee of the German Society for work protection includes reports on the use of sand, steel shot, and grit, dust-free working methods and suggestions for the solutions of various problems.
- 340 LABOR STANDARDS. New publication.
The Survey of Labor Law Administration, published for some time in mimeographed form by the U.S. Department of Labor, Division of Labor Standards, has been superseded by "Labor Standards" in a neat printed form. It contains sections entitled: Promoting Labor Standards, Safety and Health, State Labor Law Administration, Conferences and Conventions, and Of General Interest, with news items under each, of interest alike to employer and employee. It is issued monthly at 75 cents per year or 10 cents per copy and can be obtained from the Superintendent of Documents, Washington, D. C.
- 341 REGIONAL SAFETY CONFERENCES. Safety Eng. 75, 12 (April 1938).
Among the state safety conferences in the near future, the following are announced: Fourth Annual Virginia State-Wide Safety Conference, at Norfolk, June 3-4; Ninth North Carolina State-Wide Industrial Safety Conference, at Asheville, June 10-11; and the 1938 Western Safety Conference, at Los Angeles, Sept. 12-16.
- (B) Papers on Dust, Dust Diseases and General Industrial Hygiene.

- 342 DUST SAMPLING WITH THE BUREAU OF MINES MIDGET IMPINGER, USING A NEW HAND-OPERATED PUMP. J. B. Littlefield and E. H. Schrenk. U.S. Bur. Mines, Rept. Invest. 3387 (Mar. 1938). Obtainable from Division of Information, U.S. Bureau of Mines, Washington, D. C. No charge.
The midget impinger described in our February bulletin, abstract #108, can be used with a hand-operated pump, described in the present Report. The pump consists of 4 cylinders with pistons and valves, 2 surge tanks and a gauge. The outfit is carried in a case with 9 impingers, and in operation the closed case is held by straps passing over the operator's shoulder, with a rubber tube leading from the case to the impinger. A flow of 0.1 cubic foot per minute is obtained with a vacuum of 12 inches of water. Good agreement was obtained in a number of comparisons of the regular and midget impingers, in a wide range of

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dust concentrations, in 15-minute samples. The agreement was not so good with much shorter runs, especially in low dust concentrations, after which it was necessary to ship the samples some distance for counting. It is particularly necessary to avoid contamination with the smaller instrument on account of the small volume of liquid. For the present it is recommended that the user check the midget impinger against the regular apparatus under his particular conditions.

343 CONTROL OF DUST FROM BLASTING BY A SPRAY OF WATER MIST. Carleton E. Brown and H.E. Schrenk. U.S. Bur. Mines, Rept. Invest. No. 3388 (March, 1938). Obtainable from Div. of Information, U.S. Bureau of Mines, Washington, D.C. No charge. Tests were conducted by the Bureau of Mines in cooperation with the Anaconda Copper Mining Co., on the effectiveness of a spray of water mist in reducing the concentration of dust in the air shortly after blasting and during mucking of the blasted material. The determinations were made in 3 specially selected rock headings with and without the use of a spray of water mist. The impinger method was used for sampling throughout. The use of the spray apparently made it possible to reduce the concentration of dust generated and thrown into the air during blasting more than 99% from the amount present when the spray was not used. That condition was generally reached in 2 of the 3 series of tests. In the third the reduction averaged about 86%. The difference was evidently due to accumulated dust on the walls which was thrown into the air by the force of the explosion. These tests showed the importance of keeping the walls of working places free from settled dusts. Dust dissemination during mucking of material sprayed several hours before mucking was begun was much less than during shoveling of material thoroughly sprinkled just before and during mucking, and naturally the dust present after either spraying or sprinkling is much less than if the mucking had been dry. The results obtained indicate that study and adoption of a spray method for controlling dust during blasting might be profitable to operators who are faced with this dust problem. The use of such sprays is limited in places where there are serious objections to increasing the humidity of the air.

344 METHODS FOR PROTECTION AGAINST SILICOSIS AND WHEN THEY ARE JUSTIFIED. D. Harrington. U.S. Bur. Mines, Inform. Cir. #6989 (Feb. 1938). Obtainable from Division of Information, U. S. Bureau of Mines, Washington, D.C. No charge. Although the hysteria regarding silicosis and other occupational diseases has apparently subsided, it would be poor policy for employers to relax and revert to past conditions. Fairly comprehensive occupational disease legislation will probably be in force in nearly all states within the next 5 years, and the far-sighted industrialist should study possible hazards and apply known remedies whenever possible. Although the dust laws are directed especially toward elimination of silica dust, the engineer is making a bad mistake if he allows men to breathe heavy dust concentrations of any material. Dust in great quantities decreases efficiency of men and machines and causes respiratory trouble. Any visibly dusty atmosphere is too dusty and indicates that preventive measures should be applied. After removal of the visible dust, further investigations of the occurrence of invisible dust may sometimes be necessary. Dust control should be kept in mind in design and equipment of workplaces. The various means of dust control - wet methods, dust-exhaust systems, ventilation and dust traps for dry drilling all have their definite applications. Blasting practice should be changed to gain maximum possible efficiency from explosives, thus reducing the amounts of poisonous gases left. Among possible improvements are the use of stemming and new types of blasting plugs, confining the time of blasting to the end of the shift, with adequate ventilation, wetting and water-blasting. The use of dust respirators should be considered as an emergency measure. Good housekeeping and physical examinations should be maintained and education of employees should be conducted so as to secure their co-operation.

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- 345 REVIEW OF LITERATURE ON CONDITIONING AIR FOR ADVANCEMENT OF HEALTH AND SAFETY IN MINES. D. Harrington and Sara J. Davenport. U.S. Bur. Mines, Information Circular No. 7001 (March 1938). Obtainable from Div. of Information, U.S. Bureau of Mines, Washington, D. C. No charge.

This circular is the first of a series of 3 papers constituting a review of the literature on air conditioning in mines, with particular reference to health, safety and efficiency. This paper deals with the physiological aspects of exposure to air contaminated with organic matter, noxious and toxic gases and dusts. The other papers will discuss the effects of abnormal temperatures and humidities and theoretical and practical methods of air conditioning. Space does not permit making an abstract of the 34 mimeographed pages in sufficient detail for mining companies who are interested, and they are advised to obtain the original paper. After an introduction, chapter 1 treats of general foulness of underground air, including general physiological effects. Chapter 2 is a thorough discussion of gases encountered in mines, including blackdamp (mostly nitrogen and carbon dioxide), firedamp (largely methane and other hydrocarbons), afterdamp (a mixture of gases resulting from fires and explosions) and the individual gases, carbon dioxide, carbon monoxide, nitrogen, oxides of nitrogen, sulfur dioxide and hydrogen sulfide, with several pages devoted to the effects of oxygen in both excessive and insufficient quantities. Chapter 3 deals more briefly with dusts and their effects and dust prevention. The bibliography contains 70 references.

- 346 MEASURES THAT CONTROL DUST HAZARDS. Albert E. Russell. Abstracted in National Safety News 37, 34-6, 66 (April 1938).

This is the report of a general address, emphasizing the necessity of education of industrial physicians and sanitary engineers in the knowledge and recognition of occupational diseases. Individual tolerance to poisons is discussed. General control measures are recommended, including substitution of inert for harmful substances, isolation of hazardous processes, use of wet methods, local exhaust ventilation, personal protective measures, selection of qualified persons, and keeping of sickness records.

- 347 SPRAY ATOMIZERS FOR DUST ABATEMENT. William Phillips. Mining J. (Phoenix, Ariz.) 20, 155-60 (1938).

Atomizers employing deliquescent saline compounds (chlorides of magnesium, calcium, sodium) have given beneficial results at the Santa Maria y San Juan mine. Designs for several atomizers are included, one for a spray used for the elimination of sulfur gases caused by blasting, a second which gives a high degree of atomization with small amounts of air and water and a third which yields an appreciable reduction in the dust content of the air.

- 348 SERICITE AND SILICA: EXPERIMENTAL DUST-LESIONS IN RABBITS. S.L. Cummins. Brit. J. Exptl. Pathol. 18, 395-401 (1937).

Dusts of sericite and quartz were injected subcutaneously into the ears of rabbits, and also administered by tracheal inoculation. In connection with both series dead tubercle bacilli were also used. Lesions were produced by both dusts, but quartz was more active than sericite in producing fibrosis. Sericite produced nodules similar to those resulting from silica after a long interval. Sericite and dead tubercle bacilli introduced simultaneously led to extensive necrosis and sinus formation in 2 rabbits. Inoculation with quartz dust and the dead bacilli was less destructive than when sericite was used. On the other hand, if the bacilli were added after inoculation with the dust, irritation was in evidence with quartz dust lesions, but not when sericite had been used. The author believes the experiments suggest that, possibly, sericite may not be quite an inert dust.

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- 349 USE OF ADEQUATE RESPIRATORY PROTECTIVE EQUIPMENT. W.P.Yant. Mining J. (Phoenix, Ariz.) 21, No. 4, 46 (1937).

No reprints are available. This paper is a brief review of the author's work which has appeared in Bureau of Mines publications and elsewhere. Protective equipment which has been approved by the U.S. Bureau of Mines has proved successful in combating silicosis, as well as other diseases or infections from breathing dusts, whether dry or supported in a water mixture. Among other uses, the respirators also protect against inhalation of the mist produced in chromium plating and in spray-coating operations with vitreous enameling, also against inhalation of lime during its application to the soil and of powdered insecticides used on plants and shrubbery.

- 350 TESTING DUST RESPIRATOR FILTERS. O.M.Faber. Staub. 344-371 (1936). German. The work of the German committee for dust protective apparatus is described. The author gives a critical description of the filter testing methods of several German investigators and suggests a new and relatively simple apparatus for the purpose. He suggests tests of masks actually worn in plants and raises the question as to how long a mask can be used and how over-use can be prevented. An apparatus for producing dust clouds is described.

- 351 SILICOSIS IN FOUNDRIES. Elmer F. Andrews and Leonard Greenburg. From abstract in Safety Eng. 75, 49-50 (April 1938). Full information on the original is not at hand, but it probably can be obtained from the N.Y. State Dept. of Labor, 80 Centre St., New York City. (see note last page.) A preliminary report on a thorough study of silicosis has been issued by the New York State Department of Labor. Each of the 311 foundries in the State was carefully inspected and 80 were selected for special study, on the basis of a representative cross-section of the industry. Roentgenographic examinations were made and occupational histories taken on 4,066 workers out of the total of 4,169 employees of the selected foundries. Silicosis was found in 110 cases, including 88 in the first stage, 16 in the second and 6 in the third. Signs of tuberculosis were present in 15. The engineering investigation of all foundries showed that 32 foundries were in good condition, 91 fair, 150 poor and 57 bad. Great variations were found in the character of the dust problem. Age of the worker in itself, apart from exposure, was not found of particular significance. The incidence of silicosis naturally increases with time of exposure. Of the 80 plants studied, 37 were entirely free from silicosis. They were mostly small foundries, and the laws of chance would account for that proportion. Contrary to expectation, the silicosis rates among 180 colored workers were lower than those for the group as a whole. General recommendations for foundry dust control are included.

- 352 FOUNDRY DUST CONTROL MEASURES. Theodore Hatch. Ind. Bull. 17, 114-8 (March 1938). Reprints obtainable from Division of Industrial Hygiene, New York State Dept. of Labor, 80 Centre St., New York, N.Y. The following steps are involved in the production of a metal casting: (1) preparation of mold and core; (2) melting and pouring of the metal; (3) breaking out casting from the mold and removal of core sand; (4) reconditioning the molding sand for further use, and (5) cleaning the casting. Each of these processes is discussed with reference to dust produced and means of dust control. Mold and core making is not essentially a dusty process, as the sand is wet with water and oil, but dust may arise incidentally from spraying silica wash on cores and from sand and other material scattered on the floor. Mechanical molding is more dusty than hand molding, and local exhausts may be needed.

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Likewise, melting and pouring do not necessarily cause much dust in themselves, but the heat and general activity set considerable dust in motion, and poisonous metal fumes are generated in non-ferrous molding. The shakeout causes much dust dispersion, but it can be reduced by allowing castings to cool as much as possible, by wetting molds and floor, by delaying the shakeout until the night shift or the end of the day, and by general care in handling. Sand reconditioning may or may not produce dust, depending on the method used. Magnetic separation of metal and dry reconditioning are especially likely to raise dust. Castings are cleaned by tumbling or blast cleaning. The amount of dust from tumbling depends upon the tightness of the barrel and the amount of exhaust ventilation, and dust escapes during loading and discharge of the castings. Blast cleaning is necessarily dusty and the best remedy is enclosing the operation. Good housekeeping and efficient local exhaust hoods are urged in all processes. Proper building construction and plant layout and general ventilation are discussed, with suggestions.

- 353 INDUSTRIAL EXHAUST VENTILATION. RESISTANCE OF MISCELLANEOUS FITTINGS. John L. Alden. *Heat. & Vent.* **35**, 40-1 (April 1938) See abstract #206 March bulletin. In this paper the author discusses the effect of the form of elbows, enlargements, tapers, tees, breechings and "transformers".

- 354 DECISIONS ON SILICOSIS CASES. F. Sommer. *Monatsschr. f. Unfallheilk.* **45**, 74-95 (1938). German.

The author reports his experience in a number of silicosis cases, especially those made very difficult legally by the wording of German laws. In two cases in which X-ray findings could not explain the severity of the symptoms, non-pulmonary tuberculosis was found at autopsy. The author states that determination of silicosis is possible by exhuming a body some time after death. Silicotic tissue is very resistant to putrefaction. One body was exhumed two years after death and the existence of silicosis was proved.

- 355 SILICOSIS AS A MEDICAL AND SOCIAL PROBLEM. E. Elizaguirre. *Revista Assoc. Med. Argentina* **51**, 51-59 (Dec. 1937). Spanish.

The author surveys the important work done in silicosis and cites a case that was brought to his attention. A man aged 40 had been working at sandblasting 7-1/2 years but had left on account of dyspnea, thoracic oppression and frequent colds. No tubercle bacilli were found. X-ray examination showed dense shadows in the middle and upper parts of both lungs. There was frequent rise of temperature with increased expectoration. The patient died at the age of 44. The autopsy showed pleural exudates, marked lobulation, and some granulation. Heavy deposits of iron, silica and coal dust were seen under the microscope, and the general picture was one of fibrosis, although in some places the fibroblasts had disappeared. Lung permeability was absent. Large multinuclear cells were found, differing in morphological characteristics from those seen in tuberculosis.

- 356 REDUCE DUST COUNT TO MINIMUM WITH REDESIGNED BOOTHS. *Ceram. Ind.* **30** 68-70 (April 1936).

The brief article relates how the dust in the electrical porcelain department of the General Electric Co. was greatly reduced by installation of water-wash booths and later by the redesign of the booths. Dust concentrations of 3.8 million particles per cubic foot are now obtained at the operator's nostrils, while the count in the room outside is 3.5 million.

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- 357 **PULVERIZING SILICA SAND.** D.M. Wilhelm. Rock Prod. 41, 47-8 (April 1938).
This is a brief illustrated description of the plant of the Milwood Sand Co. at Zanesville, Ohio. The dust hazard has been practically eliminated by the use of dust seals on all equipment in which dust is generated.
- 358 **SOLVING THE DUST PROBLEM.** F.W. Ortman, Jr. Safety Eng. 75, 13-6 (April 1938).
Information obtainable from the author, Personnel Manager, Koppers Company, Baltimore, Md.
The author briefly describes the dust control methods used in the grinding, milling and boring department of the Koppers Company at Baltimore. The original equipment, consisting of a number of installations was replaced by a central dust collection system, which has proved satisfactory for 13 years, with improvements that have been added more recently. The area of the screen has been increased one-third by the adoption of an improved type of screen, without increasing the size of the screen house. As an auxiliary measure, a large portable vacuum cleaner, with interchangeable nozzles, is used for cleaning walls and ceilings.
- 359 **THE BEARING ON SILICOSIS QUESTIONS OF THE THIRD LAW FOR EXTENSION OF ACCIDENT INSURANCE TO INDUSTRIAL DISEASES.** Lohtkemper. Zbl. f. Gewerbehyg. 15, 9-12 (1938). German.
The author discusses the present German law, which puts all forms of silicosis on a par with accidents, and, like many of our new State laws, paves the way for proper preventive measures. He also reports on some of his own experiences, including cases of silicosis in chamotte workers and in clay tube factories. One case was that of a man who, for a year, had shoveled grain mixed with sand, and another was severe silicosis in a worker employed in a room near a sand-blast. The author cautions against exaggerating apparently alarming symptoms, such as old calcareous foci; on the other hand, a careful history is essential and special attention should be given to light forms of silicosis contracted in earlier work.
- 360 **ASBESTOSIS AND ITS PREVENTION.** T. Windel. Arbeitsschutz, 26-32 (1938) German.
In continuation of the author's earlier work (abstract 271, May, 1937), he first presents more material on asbestosis in the textile industry. There are now about 1300 asbestos workers in Germany, and about 1000 are considered to be dangerously exposed, including weavers. Up to March 31, 1937, 27 cases of asbestosis, of which 16 were fatal, were reported. In 6 months of operation of the new compensation law, 10 cases have been indemnified. The earliest observed symptoms of the disease are seen after 3 or 4 years' work. An X-ray examination of each new employee should be made, and another after 3 years and at regular intervals. Above all, observers must prove whether or not a light case will inevitably progress in spite of removal from exposure. Obsolete and new protective measures are contrasted, with illustrations, and the necessary technical improvements are described.
- 361 **A PHOTONEELECTROMETER - AN INSTRUMENT FOR THE MEASUREMENT OF TURBID SYSTEMS.** R. L. Libby. J. Immunol. 34, 71-73 (Jan. 1938).
An instrument for measuring the turbidity of liquids is described in this paper, which is included on account of the possibility of the application of the method to the estimation of the turbidities of impinger dust samples. Light from a constant source is condensed by lenses and transmitted in a parallel beam through the liquid under observation and falls on a blackened surface, on which a substance causing a current to be generated under the influence of light is placed, not in the direct beam but around it. The E.M.F. generated is registered by a galvanometer and is a measure of the scattered

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light. The author found the device sensitive to about 0.05 mg. of barium sulfate.

- 362 OPTICAL PROPERTIES OF SMOKE PARTICLES. Herbert Friess. *Gasmasker* 9, 137-40 (1937). German.

This is a discussion of the principles underlying the effects of smoke particles upon light passing through the smoke and the utilization of these effects in studying the nature of smoke. The ultramicroscope and the Tyndall meter are described briefly as instruments for measuring smoke concentration or density. The application of these instruments as means for testing the effectiveness of smoke filters is also described.

- 363 CASE OF SILICOSIS. D.Rist, P.Vallier--Radot, G. Maurice, J. Lenant and Gauthier-Villars. *Bull. et. mem. Soc. d. hop. de Paris* 54, 214-221 (1938). French.

The authors report on a case of silicosis in a casting polisher, describing the clinical course and X-ray and pathological findings. They found pneumothorax, adhesion of lung to costal pleura, emphysema and many very small nodules, up to 1 cm. in size, the larger ones being caseous. Tubercle bacilli could not be detected by a careful search. The authors consider the case to be a proof of the effect of tuberculosis on an existing silicosis. No signs of silicosis were detected in 8 other polishers with many years' experience.

- 364 DISEASES OF THE TEXTILE INDUSTRY, CAUSES AND PROPHYLAXIS. E.R.Hurtado. *Revista del Trabajo* 1, 79-86 (Oct. 1937). Spanish.

The author considers dust the most important cause of disease in the textile industry. In the cotton industry in Mexico, the dust consists mostly of fine cotton particles and sand. Chemical analysis of the dust revealed the presence of 50.3% silica, which accounts for the pulmonary trouble found among the laborers. The author recommends ventilation of the carding machines and use of respirators.

- 365 PRELIMINARY INDUSTRIAL HYGIENE SURVEY OF THE KANSAS ZINC AND LEAD MINES. C.C. Dills and A.L.Nichols. *Invest. Rept. No. 1, Ind. Hyg. Section, State Board of Health, Lawrence, Kansas*, (Dec. 1937). Copies obtainable at above address.

This preliminary survey has been conducted to familiarize the department with methods of mining, dust control, statistics on employment, disability, and social environment, and to formulate a program for occupational disease control. The following recommendations are made: (1) collection of routine dust and air samples in each mine; (2) pre-employment and annual physical examinations of miners; (3) strict enforcement of regulations for safety and dust prevention; (4) better ventilation of working areas; (5) improvement of underground sanitary facilities; (6) additional health services in the mining district; (7) prevention of dust arising from wind erosion of chert piles; and (8) detailed studies of the different mines.

- 366 THE DOCTOR'S PART IN DUST HAZARD CONTROL. A.D.Lazenby. *Safety Eng.* 75, 45-8 (April 1938).

This address before the Annual Safety Congress defines and emphasizes the part to be played by the doctor in the field of occupational disease prevention. Only recently has the medical profession begun to consider man's environment as part of its responsibility. "Medical research has a definite place in industry, not merely to study such things as occupational diseases, but to study the entire problem of the reaction of the worker to his particular environment, mental and physical; to help create an environment suitable to the structure and physiological limitations of the human machine. For, after all, it is the human worker who turns the wheels of industry. We must not grind him to bits

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in the very cogs that he himself manipulates." More specifically, in the field of silicosis, the physician must be able to tell the engineer what dusts are dangerous, and must be trained in the examination of persons employed and to be employed to work in dust. It is not his function to count or analyze dust or to apply preventive measures, but rather to interpret the results in terms of physiological hazard and to advise when prevention is necessary. A general discussion of silicosis is included, and the need of research, both engineering and medical, is emphasized.

- 367 THE GLYCOLS AND THEIR DERIVATIVES. Leonard J. Goldwater. Ind. Bull. 17, 119-20 (March 1938). Reprints obtainable from Div. of Industrial Hygiene, New York State Dept. of Labor, 80 Centre St., New York, N.Y.
- In this, the fourth paper on the subject, dioxan (diethylene dioxide) is discussed. It has a number of commercial applications, especially as a solvent in a large number of industries. The symptoms found in an investigation by the Public Health Service and Bureau of Mines after prolonged exposure range from eye, nasal and lung irritation to congestion and edema of the lungs and hyperemia of the brain. The authors conclude, however, that "considering the low toxicity of dioxan vapor and the warning intensity of concentrations below those which produced serious harm to guinea pigs, it appears that health hazards are slight under ordinary conditions of usage and reasonable exposure." Fatal cases of dioxan have been reported without full details, but it is stated that the vapor was inhaled. Autopsies showed hemorrhagic nephritis and central necrosis of the liver. In other exposed workers, the only constant abnormal finding was an increase in neutrophilic leucocytes. Additional animal experiments showed similar effects, with the conclusion that dioxan is by no means as innocuous as it is generally supposed to be.

(C) Papers on Industrial Poisons, Cancer, Dermatitis, etc.

- 368 THE FORMATION OF OXALIC ACID FROM ETHYLENE GLYCOL AND RELATED SOLVENTS. F.H. Wiley, W.C.Hueper, D.S.Bergen and F.R.Blood. Haskell Lab. of Industrial Toxicology, Wilmington, Del. J. Ind. Hyg. & Toxicol. 20, 269-77 (April 1938). Reprints obtainable at the Haskell Laboratory address.
- Ethylene glycol, its mono-acetate, diethyl ether, dihydroxy ethyl ether, and mono-methyl ether, dioxan and ethanol amine were injected into animals to investigate the formation of oxalic acid. Only ethylene glycol and its mono-acetate were found to give an increase in urinary oxalic acid. One injection of ethanol amine was fatal, so the oxalic acid formation could not be determined. The amounts of oxalic acid found from these compounds are scarcely sufficient to explain their toxicity. Compounds containing ether linkages do not seem to hydrolyze in the organism. From the experiments of others, it is apparent that the production of oxalic acid is dependent upon the formation of a two-carbon compound, both carbons of which are partially oxidized. All animals showed degenerative changes of the kidney which were of milder degree, but no oxalic acid deposits were found in the renal parenchyma as observed by others. The occurrence of these degenerative changes proves systemic organic injury following the introduction of these substances.
- 369 TRICHLORETHYLENE DEGREASING-ENGINEERING ASPECTS. William B. Harris. Ind. Bull. 17, 120-1 (March 1938). Reprints obtainable from Div. of Industrial Hygiene, N.Y. State Dept. of Labor, 80 Centre St., New York, N.Y.
- The control of trichlorethylene vapors in degreasing operations offers a very interesting and difficult problem in the control of organic vapors. Trichlorethylene is widely used in removing oil films from metal parts preparatory to plating or spray painting. The equipment consists of a metal tank containing the solvent which is heated to boiling, and a water jacket around the upper

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portion for condensation of the vapor. The metal parts are dipped into the liquid and then raised into the vapor until they are thoroughly rinsed by the condensed liquid. The outstanding factors disturbing the effectiveness of control features designed into the machine are: (1) extraneous currents in the working place; (2) withdrawal of liquid solvent with the cleaned parts; (3) improper operation of the machine and of the cleaning-out cycle. The heaviest exposure of the operation to vapors occurs during the cleaning-out of the machine, when the solvent is distilled and the remaining sludge must be raked out. For control of these hazards, the tank should be situated where there is a minimum of air movement, and no forced ventilation should be used. The heating of the solvent should be controlled thermostatically. The temperature of the cooling liquid should be low enough to insure complete condensation of the vapors, but should never be less than the dew point temperature of the room; otherwise moisture would condense in the tank, increasing the diffusability of the solvent. If the machine is gas heated, a positive suction should be placed on the flue, and none of the vapors should come in contact with welding operations or other open flame. Care should be taken to allow the parts being cleaned to reach the boiling temperature of the solvent before withdrawal. The operator should be provided with an organic solvent type respirator. Observations of two machines operating under good and bad conditions confirmed the necessity of these precautions; a concentration of 50 p.p.m. of trichlorethylene was found at breathing level in one case and 500 p.p.m. in the other.

- 370 THE IDENTIFICATION OF THE ACTIVE CRYSTALLINE SUBSTANCE FROM LIVER WHICH PROTECTS AGAINST LIVER DAMAGE DUE TO CHLOROFORM OR CARBON TETRACHLORIDE; AND A STUDY OF RELATED COMPOUNDS. R.C.Neale and H.C.Winter. *J. Pharmacol. Exptl. Therap.* **62**, 127 (Feb. 1938).

It has been shown in earlier papers that administration of a new fraction of liver extract protects against the toxic effects of carbon tetrachloride and of chloroform. The present paper describes the preparation of this fraction and its identification as mono sodium xanthine. Doses of 100 mg. given subcutaneously to rats 24-48 hours prior to narcosis had some effect, and two doses gave complete protection. Early administration is necessary. A list of several other effective substances is given.

- 371 EXAMINATIONS OF LIVER FUNCTION IN DOGS POISONED WITH CARBON TETRACHLORIDE AND PHOSPHOROUS OIL. E.Aubertin, A. Lacoste, R. de Lachaud and R. Martinet. *Compt. rend. Soc. de biol.* **127**, 57-60 (1938). French.
The liver function of dogs poisoned by prolonged dosing with carbon tetrachloride and phosphorous oil was studied carefully and liver changes were noted at autopsy. The function damage seemed to differ from that in men. It was noteworthy that pronounced liver changes at autopsy were seen in dogs which seemed entirely healthy and in which only slight blood and urine changes had been noted.

- 372 STUDIES ON THE FORMATION OF METHEMOGLOBIN. VIII. THE THEORY OF METHEMOGLOBIN FORMATION FROM ANILINE. G. Schwedtke. *Arch. f. exp. Path. u. Pharmacol.* **188**, 121-129 (1938). German.

In experiments with rabbits it was shown that one molecule of aniline reacts more than once with an equivalent one of hemoglobin. A partial breakdown of the aniline occurs before the action is complete. The amount of methemoglobin formed has a linear relationship to the dose of aniline injected.

- 373 INFLUENCE OF ALCOHOL ON THE METHEMOGLOBIN FORMATION FROM ANILINE. G. Schwedtke. *Ibid.* **130-137** (1938). German.

Experiments on cats and mice shown that the aniline effect on blood pigment is increased in the presence of alcohol, as is also true in men. Administration of alcohol a few hours after the aniline injection checks the disappearance of the methemoglobin.

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- 374 X. METHEMOGLOBIN FORMATION FROM NITROBENZENE. J. Schwedtke and Lo-Sing. Ibid. 138-142 (1938). German.
After subcutaneous injection of an oily nitrobenzene solution in cats, methemoglobin formed in the blood gradually but remained for several days, instead of disappearing more quickly as when aniline is administered. Nitrobenzene has no effect when simply sprinkled on the skin. Injuries to men ascribed in the literature to nitrobenzene, for instance from stamping ink, are in reality cases of aniline poisoning.
- 375 XI. DINITROBENZENE. W. Heubner and Lo-Sing. Ibid. 143-151 (1938). German.
Dinitrobenzenes are considerably more toxic than nitrobenzene. The para compound is the most toxic. As with aniline, there is a "circular process" in which the poison reacts continuously. Amounts of methemoglobin formed by dinitrobenzene may exceed the equivalent ratio 3 times with the ortho compound, up to 20 times with the meta, and up to 100 times with the para. The conversion of the blood pigment by the poison thus has a catalytic character. The intermediary amidophenols evidently have the chief share in methemoglobin formation.
- 376 MEDICAL PREVENTION OF CHRONIC BENZENE INTOXICATION WITH SPECIAL REFERENCE TO URINARY SULFATES. Enrico C. Vigliani and Giannini. Rass. Med. applicata lavoro ind. 8, 376-403 (1937). Italian.
Conjugated sulfates represented 60-70% of the total sulfates eliminated by workers exposed to benzene vapors; they comprised only 10-20% of the sulfates in the control groups. The determination of urinary sulfates together with the hematological picture was considered a good test for chronic benzene intoxication.
- 377 STUDIES ON LATENT BENZENE POISONING. P. Emile-Weil, Perles, and A. Aschkenasy. Sang. 12, 151-179 (1938). (French).
Characteristic benzene poisoning symptoms were found in workers engaged in Gluing together rubber coats, using a rubber adhesive dissolved in benzene. Only such workers were examined as had not been officially reported ill. Tabular results are given. Red blood counts below 4 million were present in 33% of the men and 82% of the women, all apparently healthy. White blood counts below 5000 were found in 36% of the men and 63% of the women. Leucopenia, eosinophilia and increase in coagulation time were in evidence in 25% and less of the cases. Thrombopenia was found in 66%, and a tendency toward aplasia in a third of those tested. Hypochlorhydria in the stomach contents was found in all of 8 cases examined. The authors recommend hygiene supervision of home work conditions and periodic medical examinations.
- 378 SOLVENTS, THEIR HAZARDS AND PREVENTIVE MEASURES. H.H. Weber. Reichsgesundheitsbl. 13, 77-79 (1938). German.
This is a very general discussion of technical solvents and their hazards. The author includes boric solutions, lubricants and tempering oils among the solvents. The dangers described include fire and explosion, acute and chronic poisoning, skin injuries and formation of harmful conversion products, and the preventive measures recommended are substitution of non-inflammable and non-toxic solvents, exhaust systems, personal cleanliness, alteration in work, etc. Finally the author calls attention to the danger arising from the use of trade names that do not give a clue to the real contents of solvents.

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References to Recent Literature - 11

- 379 BLOOD DYSCRASIAS CAUSED BY OCCUPATION: X-RAY, RADIUM, LEAD AND BENZENE. I.W. Held and A. Lieberman. N.Y.State J. Med. 38, 186-192 (Feb. 1. 1938).
The authors discuss the blood changes that occur after industrial exposure to X-rays and radium, lead and benzene, and briefly discuss the sources of such exposure and the clinical picture. They emphasize the possibility of successful treatment, provided the patient is removed from further exposure at an early stage of the disease. Differences between occupational and spontaneous blood dyscrasias are pointed out. In the former, only one part of the hematopoietic system is affected at first and the injury spreads to other parts only after a considerable length of time, while spontaneous dyscrasias, after a short period of local attack spread quickly to other portions. Exposure to X-rays and radium has an especial affinity for the hemolymph glands, producing either relative or absolute lymphocytosis. In lead poisoning, the erythropoietic system is primarily involved. Benzene has a special affinity for the leuco-blastic tissue in the bone marrow, producing an early leucopenia, leading later to secondary anemia. Xylene and toluene resemble benzene in their effects, but in a lighter degree. Nitro and amido derivatives of benzene are more toxic than benzene on account of the methemoglobinemia produced. The effects of several drugs derived from benzene are similar to those of benzene.
- 380 INDUSTRIAL POISONING FROM CRESOL. M. Duvoir, R.Hazemann, H.Descille and P. Falot. Bull. et mem. Soc. med. d. Hop. de Paris, Series 3, 54, 106-117 (1938) French.
Seven men were engaged for 1 1/2 to 3 years in producing automobile brake bands, using a mixture of cresol, formol, ammonia and asbestos. Complaints of headaches, eructation and vomiting with high blood pressure and tremors, reminded the authors of similar symptoms among surgeons who had operated under a carbolic acid spray. Urine examinations of the workers showed up to 68 mg. phenol per liter, against the normal content of 12 mg. After improvement of the industrial process, the workers' blood pressure became normal in several months and the tremors were less pronounced. Similar but lighter symptoms were seen in another plant.
- 381 OF TRIORTHOCRESYLPHOSPHATE. Adelaide Ross Smith. Ind. Bull. 17, 118-9 (March 1938). Reprints obtainable from Div. of Industrial Hygiene, N.Y. State Dept. of Labor, 80 Centre St., New York, N.Y.
This substance came into prominence in 1930 when an "epidemic" of paralysis appeared among users of Jamaica ginger, particularly in the southern states, and investigations showed it to be present as an adulterant. Later cases of paralysis were traced to the same material. It is used in industry to a very limited extent, the chief uses being in the manufacture of celluloid articles, as a plasticizer for pyroxylin lacquer, and in the recovery of phenol residues from gas plant effluents. Symptoms are described, but its exact method of action is unknown. The lethal dose in man is unknown but it is probably in the neighborhood of 1 g. per kilo of body weight. Only one case of industrial poisoning from triorthocresylphosphate has been reported, and in that case a worker was deluged with the crude hot product. On account of its low volatility, there is no hazard from the vapor. In a plant manufacturing 100,000 pounds a day without any special precautions, no cases of poisoning have occurred. Investigation has shown no poisoning from contact with celluloid articles. However, on account of its serious effects when ingested, it should be used with caution. The isomers, trimetacresylphosphate and triparacresylphosphate, also used in industry, are not toxic, but they should also be used with caution on account of the possible presence of the ortho compound.

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- 382 CARBON MONOXIDE POISONING IN INDUSTRY AND ITS PREVENTION. Special bulletin No. 194, New York State Dept. of Labor. Obtainable from the Secretary, State Dept. of Labor, 80 Centre St., New York City. Price 50 cents.
This bulletin presents briefly in a simple and practical way, the general principles of carbon monoxide poisoning in industry. A resume of the physiological effects of exposure and absorption, with outstanding signs and symptoms, is provided as a background for an understanding of the rules of prevention. More detailed consideration is then given to the more important problems of prevention of carbon monoxide poisoning in industry wherever fuel is burned, and where workers are exposed to automobile exhaust gases. The maximum permissible concentration of carbon monoxide for continuous exposure is given, as well as a general outline for the medical supervision of workers where, for special reasons, exposure to the gas cannot always be kept within safe limits.
- 383 CARBON MONOXIDE. Draeger-Hefte, No. 194 (Jan.-Feb. 1938). German.
The entire issue is devoted to a discussion of carbon monoxide. After an introduction by G. Stampe, a paper on WHERE DOES CARBON MONOXIDE COME FROM? by E. Naujok includes a graph showing the carbon monoxide content of various gases. HOW DOES A CARBON MONOXIDE FILTER WORK? by F. Bangert, describes the Draeger protective device, its uses and limitations. MEASURING CARBON MONOXIDE IN THE EXHAUST GAS OF ILLUMINATING GAS BURNERS, by Bangert, describes the Draeger detector, which is sensitive to 0.02 volume %. EXPERIMENTS ON THE CARBON MONOXIDE CONTENT OF A STREAM-LINED CAR, by E. W. Steinetz, shows very small carbon monoxide concentrations to be produced. On a long trip behind a truck with a poorly regulated diesel engine, the carbon monoxide in the car ran as high as 0.07%. Stalter describes a case of LOSS OF MEMORY IN CARBON MONOXIDE POISONING. Although the patient recovered consciousness after resuscitation, he had no memory of the time between his becoming aware of confusion in a gas-filled room until he awoke after sleeping several hours. In the final paper by K. Thiel on CHRONIC CARBON MONOXIDE POISONING, the author concludes that there is no real chronic poisoning from that gas. His conclusion is on the basis of theoretical reasoning and lack of experimental proof.
- 384 TRANSVERSE LESION OF THE SPINAL CORD AT THE LEVEL OF THE FIRST AND SECOND LUMBAR VERTEBRAE AFTER CARBON MONOXIDE POISONING. H. Zipf. Deutsch. Ztschr. f. Nervenheilk. 142, 39. (German). (1937).
In a patient who survived about a day after carbon monoxide poisoning, were found various symptoms of paralysis of the lower part of the body. Autopsy showed considerable swelling of the spinal cord at the level of the 12th dorsal vertebra, and histologic examination revealed perivascular round cell infiltrations in that region. There were no indications of another cause, and the carbon monoxide poisoning must be considered responsible for the injuries.
- 385 ACCIDENT PREVENTION IN BLAST FURNACES. F. Rabeneick. Zbl. f. Gewerbehyg. 15, 1-9, 25-37 (1938). German.
This is an illustrated detailed description of technical installations for accident prevention and protection against carbon monoxide,
- 386 FATAL POISONING FROM WELDING WITH ACETYLENE (DISSOLVED GAS). Mawich. Arbeitsschutz, 43-44 (1938). (German).
The author discusses several cases of poisoning in welders caused by oxides of nitrogen, described in British and Austrian labor office reports, and hopes for clarification by further investigation.

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NEWS ITEM.

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FOURTH SILICOSIS SYMPOSIUM.

The Fourth Silicosis Symposium will be held June 19-23, 1939 at the Saranac Laboratory, Saranac Lake, N. Y. The Symposia are held every two years to discuss aspects of and developments in the silicosis problem. This year's program is comprised of a variety of interesting and pertinent subjects by well-known authorities in the field. It will be somewhat broader than those of the past and will include, in addition to the general subjects, discussions on silicosis in various industries, as dolomite, iron, coal and gold mining, and in gypsum, cement, foundry, and other industries. It is probable that the proceedings will appear in published form following the meeting. Registration is limited to 100, tuition is \$25. Address applications to Secretary of Trudeau School, P. O. Box 131, Saranac Lake, N. Y.

387 STATISTICAL COMPILATION OF FATAL CASES OF POISONINGS (EXCEPT CARBON MONOXIDE AND ILLUMINATING GAS) AUTOPSIED AT THE MEDICO-LEGAL INSTITUTE OF MUNICH FROM 1914-1936. A Kogler. Samm. v. Vergiftungsf. 9, 1-32 (1938). (German). This paper includes reports of a number of autopsies in Bavaria, including accidental poisonings and suicides. The industrial cases include poisoning from fumes of nitric and other acids, nitrous gases and "soot inhalation."

388 GASES FROM CARBON ARCS. R.W.Coltman. Research Labs., National Carbon Co., Inc., Cleveland, Ohio. J. Ind. Hyg. & Toxicol. 20, 289-96 (April 1938). Reprints probably obtainable from author. The author investigated the production of gases produced by carbon arc lamps of various types. Carbon dioxide is naturally the chief product of combustion, but nitric oxide is always produced in quantities which are the same whether alternating or direct current is used, and approximately proportional to the arc current for any one type of carbon. Unimpregnated and therapeutic carbons give off more fixed nitrogen than carbons containing rare earths. In small enclosed spaces the nitrogen peroxide, formed immediately by oxidation of the nitric oxide, may reach concentrations above the toxic limit. The amount of carbon monoxide, even in extreme cases, is negligible from the standpoint of health hazard. Ozone could not be determined on account of experimental difficulties. The results of a number of experiments are presented in tabular form.

389 THE BIOLOGICAL EFFECTS OF INHALATION OF CARBON ARC FUMES. E.L.McQuiddy, J. Perry Tollman, Leroy W. La Towsky and Milward Bayliss. Univ. of Nebraska College of Medicine, Omaha, Neb. J. Ind. Hyg. & Toxicol. 20, 297-311 (April 1938). Reprints obtainable from senior author. The paper presents some of the results of an investigation of hazards in the motion picture industry. It was shown by the authors (confirming the results of others) that the undiluted gross fumes arising from an electric carbon arc are toxic to animals. The pathological results, given with a number of illustrations, show that the changes are produced by oxides of nitrogen.

390 THE COMBUSTION PRODUCTS OF THE CARBON ARC. E.L.McQuiddy, J. Perry Tollman, W. La Towsky and Milward Bayliss. J. Ind. Hyg. & Toxicol. 20, 312-20 (April 1938). Reprints obtainable as in preceding abstract. The results obtained with another type of arc than those used by Coltman (abstract 388) are in general agreement with those of Coltman. Four types of analysis for carbon monoxide failed to show its presence in the exhaust fumes. No sulfur dioxide was found. There is no satisfactory method for the specific determination of ozone, and its presence could not be confirmed. It was indicated that the M.S.A. carbon monoxide indicator is not specific for carbon monoxide in the presence of oxides of nitrogen. A fine ash of fairly definite composition is given off.

391 VENTILATION OF MOTION PICTURE BOOTHS. Philip Drinker and J. Raymond Snell. J. Ind. Hyg. & Toxicol. 20, 321-30 (April 1938). Reprints obtainable from Prof. Drinker, Harvard School of Public Health, Boston, Mass. A modern motion-projector lamp was set up in a 3000 cu. ft. room which could be ventilated or air-conditioned as desired. It was found that if the lamp was ventilated through the flue pipes at rates above 12 c.f.m., there was no sensible escape into the room of nitrogen tetroxide or other substances formed by the electric arc. If the ventilation is adequate to dispose of the heat so that reasonable comfort to the operator is attained, it would undoubtedly be ample for the removal of any harmful products produced by the carbon arc. A rate of 12 c.f.m. through the flue pipe is sufficient. No recirculation should be used. Where a flue pipe cannot be used, the general ventilation of the stage should be sufficient to insure adequate removal of the heat and the products of combustion.

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References to Recent Literature - 14

- 392 CANCER OF THE LUNG. Brit. Med. J. 1, 682 (March 26, 1938).
An editorial comment on the paper by J.A. Campbell, (our abstract 586, November bulletin), calls attention to his results that even where tar has been extracted from road dust 45% of the mice still developed tumors, lending some apparent support to the otherwise very debatable proposition that the inhalation of silica disposes to lung cancer. The question arises whether the lung cancer found in mice is the same as that found in man; although Campbell supports the belief that it is, caution is required in interpretation of his results.
- 393 CANCER OF THE LUNG. J. Argyll Campbell. Brit. Med. J. 1, 755 (April 2, '38)
The author, referring in a letter to the above editorial, shows the fairly close correspondence in composition between the road dust which he used and the pitchblende dust in the Joachimstal mines where the cancer incidence has been high. Both are high in silica (44% in road dust and 57% in Joachimstal) and iron oxide (4.5% and 6.5% respectively), which the author considers significant. Figures for alumina, magnesia and lime are also given. Animal experiments are being conducted with nickel dust from "old matte", from a source where the incidence of cancer is high, with the supposition that iron and other metals may play some catalytic part in the development of lung cancer. The author reiterates his belief that the lung cancer found in mice and human lung cancer are similar. (The cases of cancer in the Joachimstal mines have given rise to some controversy. Some authors attribute it to radium emanation, but others point out the very low amount of emanation present and believe that silica is primarily responsible.)
- 394 OCCUPATION AND CANCER. M. Stacmmler. Münch. med. Wchnschr. 85, 121-125 (1938). (German).
The difficulties of collecting information and lack of statistics of industrial mortality from cancer are first described. Localization of cancer depends on the site of immediate action of the damaging substance, as in the case of bladder tumors. On the other hand, definite organs and tissues probably have varying tendencies to react to a definite injury with cancer formation. Often the histological form of occupational cancer of definite organs differs from other cancers occurring in the same organs. Industrial cancer of the skin and of the lungs, for instance, is usually a squamous cell epithelioma. Furthermore, occupational cancer has a special tendency to appear in a multiple form. Often a precancerous stage is noticeable. Disposition plays only a slight role in occupational cancer.
- 395 A STUDY OF MINER'S NYSTAGMUS. Raymond S. Brock. Brit. Med. J. 1, 443-4 (Feb. 26, 1938).
There are two general theories of the cause of nystagmus; those suggesting some toxic agency, and those postulating some form of fatigue. Exposure to darkness has also been considered as a factor. No connection with carbon monoxide or other noxious gas or vapor has been proved. The author arrives at no positive conclusion but states that: (1) prolonged work below ground may bring about oscillation of the eyes which does not necessarily cause disablement; (2) when disability does arise it is usually due to an associated psychoneurosis, and (3) prevention depends upon recognition of these facts, treatment of contributing disorders, diminished stress in the mine, barring of unsuitable applicants, improved economic conditions, and stricter assessment of disablement.

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References to Recent Literature - 15

- 396 RHEUMATISM AND MINERS. A. Feil. Presse med., 179-180 (1938) (French).
Data accumulated in various countries often show a higher incidence of rheumatism than of tuberculosis. In workers in a group of iron mines, 100 to 200 meters deep and slightly humid, the incidence of rheumatism is 41%. Out of 100 slate workers, 22 were incapacitated by rheumatism and lumbago, and 18 out of 100 cases of sickness in the mines were of those diseases. Chronic subacute forms of rheumatism are also very common among miners.
- 397 WORK PHYSIOLOGY. I.E. Atzler. Ergeb. d. Physiol., Biol. Chem. u. exp. Pharmakol. 40, 325-436 (1938). (German).
In this first paper of a series the author says in his definition of work physiology: "We must search for ways to bring the working man to his highest physiologic efficiency and keep him in this condition as long as possible. We must arrange his work so that it corresponds to the laws of the human organism; above all, we must construct machinery and tools properly and adjust the operations to physiological rules." Heavy work is considered in this paper, with detailed discussion of the processes of the organism (metabolism, blood sugar, internal secretions, heart, circulation and respiration). The influence of training is next considered, and a discussion of fatigue follows, with a description of the fatigued muscle, the anatomy and chemistry of fatigue, and its effect on the nervous system.

Abstract 351

Additional information - Also abstracted in Ind. Bull. 17, 61-2 (Feb. 1938).
Reprint of abstract obtainable at address given, and the original should be available now or at an early date, as a Special Bulletin of the New York State Department of Labor.

Correction:

Abstract 310, April bulletin. The author's name should be L. Breitenecker and the reference, Deutsch. Ztschr. f. d. ges. gerichtl. Med. 29, 187-9 (1936).

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