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REFERENCES TO RECENT LITERATURE ON INDUSTRIAL DISEASES

(A) News Items

- 700 INDUSTRIAL HYGIENE--AMERICAN PUBLIC HEALTH ASSOCIATION. Ind. Med. 7, 589 (September 1938).

The Industrial Hygiene Section meeting of the 67th annual convention of the American Public Health Association to be held at Kansas City, October 25-28, 1938, should contain material of interest to all who have industrial medical problems. The addresses, as they are published, will be abstracted in this bulletin.

- 701 NATIONAL SAFETY CONGRESS. Ind. Med. 7, 589 (September 1938).

The National Safety Congress and Exposition will hold its annual meeting October 11-14 at the Stevens Hotel, Chicago. There will be sessions on Dusts, Fumes, Gases and Vapors; Industrial Nursing; Occupational Disease, and Health Services in Industry. Any articles of interest will be noted and abstracted in this bulletin.

- 702 NEW BOOKS

OCCUPATION AND HEALTH--SUPPLEMENT. International Labor Office, 734 Jackson Place, Washington, D. C.

This supplement, which will consist of 500 pages when completed, can be purchased for \$5.00. The first installment to this last supplement comprises 88 pages and includes five brochures on "Allergy and Occupation," "Asbestos," "Beryllium," "Pneumoconiosis," and "Silicosis."

TOXICITY OF INDUSTRIAL ORGANIC SOLVENTS.

A compilation by Ethel Browning, of the numerous solvents used in industry. It discusses properties, uses and toxicity, and should be a valuable reference to those interested. The book is a British Publication. The U. S. address is The British Library of Information, 270 Madison Ave., New York City. Price 7s 6d (about \$2.00).

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

- 703 PNEUMOCONIOSIS (PULMONARY DISEASE DUE TO DUST). L. Teleky. Occupation and Health, Supplement, Internat. Labor Office, Geneva (January 1938). (One of the supplements mentioned in News section of this Bulletin).

This is one of the best reviews and one of the most readable that has yet been written on the subject. Dr. Teleky has placed the dusts into 8 classes according to actions as follows, briefly: irritants, coniotic action over long periods, micro-chemical action forming lesions (quartz), chemical action with inflammatory processes, cancerogenic action, allergic action, infectious action and toxic action. In the first half of the paper, mechanics and physiology of dust inhalation are considered, together with concentrations found and the pathological and roentgenographical significance of mixtures. The second half discusses the effects of breathing various dusts, including grain dusts, dusts like

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References to Recent Literature - 2

Thomas slag, and various minerals. Bibliography is brief, and is limited to well-known references.

- 704 **PATHOLOGY OF THE SILICOTIC NODULE.** Joseph Walsh. *Am. Rev. Tuberc.* 38, 363-71 (September 1938). White Haven Sanatorium, White Haven, Pa.
The author presents the results of 20 years of observation of anthracosilicotic lungs, with several photomicrographs of affected lymph nodules. In his summary, he states that anthracosilicotic dust within the tissues of the lung is always found in cells until after necrosis sets in. These cells are carried in lymph channels to intrapulmonary and hilar nodes. The pulmonary fibro-anthracosilicotic nodule begins by thickening of the interstitial tissue around lymphatics, the development of fibrous tissue in alveolar walls and destruction of the elastica which allows the alveoli to collapse. The typical single nodule is smaller than a millet seed and is made up principally of collapsed and coalesced alveolar walls. Later occur hyalinization and necrosis beginning in the interior. A large nodule is always conglomerate, and is made up of the coalescence of innumerable small ones. The silicotic nodule and its points of difference from the pulmonary nodule are described.
- 705 **SILICOSIS AND SIMILAR DUST DISEASES. MEDICAL ASPECTS AND CONTROL.** R.R. Sayers and R. R. Jones. *U.S. Publ. Health Repts.* 53, 1453-72 (August 19, 1938). Obtainable from Supt. of Documents, Washington, D.C., for 5 cents, cash.
This paper, originally presented at the National Silicosis Conference in 1938, is an excellent review of the subject, with especial attention to occupational exposure, factors influencing the action of silica dust particles, the necessity of occupational history, and prevention of silicosis. Asbestosis and anthracosilicosis are considered briefly.
- 706 **RECOVERY METABOLISM OF SILICOTICS.** A. Bohme. *Arch. f. Gewerbepath. u. Gewerbehyg.* 8, 601-10 (1938). (German).
Increased oxygen consumption accompanies all work, partly during work, partly after it (oxygen debt). In cardiac insufficiency and emphysema, oxygen consumption is more delayed in the recovery period; the oxygen debt is greater than normal. In healthy persons consumption is highest after 3, or at most, 6 minutes after stopping heavy work. In comparing normal persons with silicotics with 70-80% disability, the latter showed a marked and prolonged rise in respiration rate, increased minute volume and oxygen consumption during the recovery time and also at the end of the 10 minute observation period. In silicotics with less than 70% disability, the differences were less marked or barely detectable. The method is not applicable for adjudging compensation however, because of other influences--excitement, lack of precision and intentional emphasis of difficulties.
- 707 **THE INFLUENCE OF SILICA ON THE NATURAL AND ACQUIRED RESISTANCE TO THE TUBERCLE BACILLUS.** Arthur J. Vorwald and Anthony B. Delahant. *Am. Rev. Tuberc.* 38, 347-62 (September 1938). Reprints probably obtainable from The Saranac Laboratory, Saranac Lake, N. Y.
The authors investigated the effect of silica on resistance of animals to the tubercle bacillus. Their experiments showed that silica depresses the native resistance of the guinea pig to attenuated tubercle bacilli and of the white rat to virulent types of these microorganisms. Silica also inhibits the development of acquired resistance in guinea pigs when the irritant is confined to the tissue in which the immune bodies are being produced. This adverse influence is specific for silica and is proportional to the concentration of the irritating substance. Dusts low in silica and nonsiliceous dusts have no such effect. The authors suggest as a possible explanation the alteration of

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monocytic cells by silica in such a way that they furnish a more suitable medium for the growth of the bacillus. On the other hand, inhibitory substances normally present in such cells may be neutralized so that the bacillus is permitted to grow with unusual rapidity. At the present time only the morphological evidences of cellular alteration have been discovered. The underlying chemical factors are completely unknown.

- 708 SUMMARY OF RESULTS OBTAINED TO DATE IN A STUDY OF THE OCCUPATIONAL DISEASE HAZARDS ASSOCIATED WITH THE QUARRYING, CRUSHING AND SCREENING OF NORTH CAROLINA GRANITES. Division of Industrial Hygiene, Raleigh, North Carolina, Mimeographed. 17 pp. Obtainable at address given.

This report presents the results of a preliminary study of 15 granite quarries, in 9 of which both dust counts and medical examinations were made. The total number of workers involved was 614, of which only 360 had been exposed to granite dust for 1 year or longer. Among these workers, 13 were found to have more fibrosis than usual, and there was 1 case of first-stage silicosis. There was a preponderance of workers under 35 years of age, and about 13% of the workers in the 3 major labor divisions were more than 50 years of age. In so far as indicated in the small number of cases, an increasing incidence of pathology with advancing age is revealed. The increase with exposure is fairly uniform until an exposure of 30 years is reached, at which point the incidence rises precipitously. Dust counts were made to evaluate the dust exposure associated with specific tasks, and the cumulative dust exposure was computed for every worker whose occupational record is sufficiently long. A distribution by occupation and cumulative dust exposure reveals that the condition "more fibrosis than usual" exists in every classification and that silicosis appears when the cumulative exposure reaches 1500 million particle years of dust. (This refers to granite dust, shown by a number of analyses to contain 30 to 40% quartz.) This corresponds to a daily exposure threshold limit of 35 million particles per cubic foot over a period of 40 years. As a factor of safety the average (granite) dust exposure should not exceed 25 million particles per cubic foot. The exposure in many major quarry occupations exceeds that figure where no safeguards are employed. The exposure may be reduced to a safe level by the use of wet methods. The results indicate a definite hazard, although not so severe as was expected. Final conclusions must be postponed until more men with over 10 years' exposure to granite dust can be examined.

- 709 SILICOSIS IN POTTERY WORKERS. R. A. Kemp Harper. Brit. J. Radiol. 11, 354-65 (1938).

The clinical and industrial factors producing silicosis are discussed. A survey of the industry in 1932 showed that about one-third of the pottery workers of all branches had acquired the disease at the end of 20 years' exposure. Important factors are (1) silica concentrations in the dust, (2) duration of exposure, (3) cleanliness, and (4) precautions taken by employers. In modern factory buildings efficient design has greatly reduced the dust content of the air, and the use of alumina instead of flint has reduced the disease incidence. Research is being directed toward the discard of dangerous materials in the bedding processes. Physique of workers is important in disease resistance; certain physical types are undesirable for work in any quarter or process. Tuberculosis, even in the early stages, constitutes a menace. The author discusses the two main types of silicosis as first recognized in South Africa, namely, simple or noninfective, and infective, especially their radiological distinctions and characteristics. He remarks that "the pottery worker in general tends to acquire a soft type of silicosis, with less nodulation than stone masons in South Africa, but many exceptions also occur." Twelve cases are fully described with radiological reproductions for each. There is no one silicosis

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References to Recent Literature - 4

type for a given occupation, and the picture may vary greatly for the same exposure. The previous occurrence of weakening respiratory diseases such as acute bronchitis, influenza and pneumonia, causes the lung parenchyma to succumb to the inhalation of silicosis-producing dust.

- 710 SILICOSIS IN THE POTTERY INDUSTRY. J. F. Bromley. Brit. J. Radiol. 11, 345-53 (1938).

This paper is a thorough discussion of the British pottery industry and its silicosis hazards. Free silica in the form of finely divided flint is used extensively and constitutes the principal silicosis hazard. Some of the silica combinations, however, in kaolin, china clay, Cornish stone, and other materials, may modify the radiological picture of the typical free silica risks. The dry crushing process is especially hazardous; dry preparation of powdered flint dust for bedding material constitutes a serious risk. The dry earthenware body presents a special source of danger, its dried scraps giving rise to a dust composed of about one-third flint, and the risk is increased by leaving the scraps all over the floor, benches and ovens. The caster, exposed to this dust, usually develops silicosis in about 20 years. The pottery industry as a whole comprises about 60 separate occupations, in 30 of which the worker is exposed to free silica dust, either as pure flint or in a mixture. The general classes of occupation exposed to silicosis are the following: (1) millers and mill laborers; (2) slip makers; (3) workers in the potters' shop; (4) mold makers and (5) various laborers who are incidentally in dusty departments. Numerous risks are eliminated by improved exhaust ventilation and by more vigorous supervision of the uses of flint. There are methods of preventing shrinking after firing without the use of flint, but potters are unwilling to use them and the public would not be satisfied with flint-free ware of particular types. The most serious risks are in bedding of biscuit ware in powdered flint and in the preparation of the flint by crushing. Death has occurred in 3 years after work in a dry crushing mill; the signs are marked in all china biscuit placers in 15 years. The recent depression has increased the number of polishers exposed, because some ware has been worked up by polishing instead of being discarded. If an efficient substitute for bedding flint were discovered, the silicosis risk would be almost entirely banished from the china potters' shop. (Other authors have mentioned the successful use of alumina for this purpose.)

- 711 CONTROL SILICA DUST AND SAND GRADATION PROBLEMS. PRODUCING AGGREGATES FOR HIWASSEE DAM. Rock Prod. 41, 29-35 (September 1938).

The construction of the Hiwassee dam in North Carolina, recently begun, is the first case in which the T.V.A. has worked in silica rock. A portion of this article describes the methods used to protect workmen from dust. The plant comprises the quarry, the primary crushing plant, the secondary crushing and screening equipment, the sizing screens and storage, and the stone sand classifying plant. In the quarry, wet drilling is used exclusively, and workmen stationed in the quarry for any length of time are required to wear respirators. In the primary crusher, the rock is wet at intervals, and discharging point of the crusher to the belt conveyor is housed and exhausted. The building containing the screens is completely enclosed, as are also the screens individually, and adequate exhaust systems are used with distant points of discharge. The dust counts are now below 5 million particles per cubic foot at all places where operators are stationed, and further reductions at some points are anticipated. All workmen are examined and x-rayed every 6 months as a check on the efficiency of dust control measures. The remainder of the paper deals with improvements in quarry operation affecting the shape of the sand particles, and control of sizing

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- 712 CHEMICAL DETERMINATION OF QUARTZ (FREE SILICA) IN DUSTS. E. Kaplan and W. T. Fales. Ind. & Eng. Chem. Anal. Ed. 10, 338 (July 5, 1938).
The writers propose the application of the compound interest law to determine the rate of loss of silica in the Knopf (hydrofluosilicic acid) and the Line and Aradine (fluoboric acid) methods for the determination of free silica. By applying Knopf's factor of 0.1% loss per day and Line and Aradine's factor of 0.34% loss per day to the mathematical formula derived from the compound interest law, the writers calculate the total free silica loss for any number of days. The chief difficulty with this procedure is that the factor of rate of loss is not constant, but varies widely with different particle sizes as has been demonstrated by Moke and Harris.
- 713 CLINICAL CONSIDERATIONS ON THE QUESTION OF INDUSTRIAL CANCER OF ASBESTOS WORKERS. F. Hornig. Ztschr. f. Krebsforsch. 47, 281-7 (1938). (German).
A 35 year old woman who worked in an asbestos factory from 1919 to 1928 fell ill of asbestosis. In 1937 a sharply defined shadow was seen roentgenographically in the upper left lobe. This shadow was considered by the author to be a carcinoma and in the decision on the case, a causal relation between the presence of asbestosis and the development of carcinoma was accepted. The correct diagnosis of carcinoma was confirmed on autopsy.
- 714 THE INDUSTRIAL CANCER OF WORKERS IN ASBESTOS. M. Nordmann. Ztschr. Krebsforsch. 47, 288-302 (1938).
The author describes 6 cases of asbestosis with lung carcinoma, of which 5 were squamous carcinoma with hornification and the other an adenocarcinoma. Most of the cases were younger than the average case of lung cancer. The exposure to asbestos had lasted 7 to 21 years, and had begun 15 to 20 years before observation of the carcinoma, with the exception of an elderly woman who had only an exposure of 19 months, 17 years before observation, and who had a high degree of asbestosis. What property of asbestos is responsible for the cancer developing on the groundwork of asbestosis is not yet known, but there may be in asbestos so-called carcinogenic substances.
- 715 TESTS OF A BARRIER USING ROCK DUST IN PAPER BAGS. H. P. Greenwald and H. C. Howarth. U.S. Bur. Mines, Rept. Investigations No. 3411, 16 pp., (August 1938). Obtainable free from Division of Information, U.S. Bureau of Mines, Washington, D. C.
A recently developed method of explosion barrier is tested by the Bureau. The method consists in dusting with limestone placed in paper bags which are mounted on posts in trackless entries. The bags are mounted in such a way as to be automatically opened by the shock waves in advance of an explosion and complete description is given of the technique used. The ten tests made were successful in every case but one. They are described as cheaper than those methods recommended in their Bulletin No. 353 but are not recommended for entries provided with track. The limestone used is especially treated to increase resistance to moisture.
- 716 SOME OBSERVATIONS ON COAL-MINE FANS AND COAL-MINE VENTILATION. D. Harrington and E. H. Denny. U.S. Bur. Mines, Inf. Circ. No. 7032, 20 pp. (August 1938). Obtainable free from Division of Information, U.S. Bureau of Mines, Washington, D. C.
Ventilation is one of the most important single operations in mining for protecting lives and in promoting efficiency of operation. During 1932 and 1935 inclusive, the explosion record in coal-mines was very good but during 1937 and 1938 experience has been bad, and it is suggested that the cause may be due

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largely to the overlooking of the ventilation requirements. This bulletin presents a summary of important considerations in ventilation including a review of state and federal laws and an explanation of the requirements. Thirty-two recommendations are listed. The record shows that most destructive explosions occur in "non-gassy" mines and the dangerous conditions may develop on short notice from seemingly unhazardous mines.

- 717 PREPARATION OF SYNTHETIC DUST. Herbert Friess. Gasmasker 10, 29-34 (1938). (German).

The paper describes a method for producing dust of a size that is uniform, reproducible and significant from the standpoint of industrial hygiene, for instance in investigations of dust filters. Water vapor is allowed to react upon the vapor of certain metallic chlorides, producing the metal oxide dust and hydrochloric acid, which is absorbed by activated charcoal. Titanium chloride was used in the experiments. The particles of titanium dioxide were 1 micron and less in size and had a definite crystal form. The dust could be reproduced in any desired amount.

- 718 INDUSTRIAL MEDICINE. THE PLAN AND SCOPE OF THE INTEREST OF THE NATIONAL ASSOCIATION OF MANUFACTURERS IN THIS FIELD. Victor G. Heiser. Ind. Med. 7, 541-5 (September 1938).

In this article, Dr. Heiser tells of the objects of the newly organized Committee on Healthful Working Conditions. The aims are to learn of the best practices now in use and help coordinate them to a more general application. From the standpoint of the industrial doctor, it is stated that not only because of a doctor's medical knowledge but also because of his knowledge of human nature, it is expected that his activities will be greatly enlarged within the next five or ten years.

- 719 THE CONTROL OF TUBERCULOSIS IN INDUSTRY--A RESPONSIBILITY AND A PROFIT. C. D. Selby, Medical Consultant, General Motors Corp., Detroit, Mich. Presented before National Tuberculosis Assoc., Los Angeles, Calif., June 23, 1938. Copies obtainable from author.

Tuberculosis is not an occupational disease, but its prevention may become industry's most important health problem for the following reasons: (1) tuberculosis is a terminal infection in silicosis; (2) there is a tendency to assume that dust aggravates tuberculosis; and (3) tuberculosis is more prevalent than the occupational diseases. On the last point, in the group studied by the author, the number of individuals who lost time on account of occupational diseases was 1.3 per 10,000 workers against 40 per 10,000 who have active lesions. The time lost from occupational diseases was 1 day per million hours' work. Industry can act as a case-finding agency, protect workmen with open cases within the plants, and safeguard workmen against conditions of employment that might accelerate minimal lesions or aggravate quiescent ones, but it cannot control outside causes even though the employee group is affected. So far as industry is concerned, the sound long range program is to clear the plants of tuberculosis and to keep them clear. These considerations lead to a health maintenance program which the author proposes, not only for prevention of tuberculosis, but to include prevention of all possible hazards. This program includes procedures for control of: (1) sources of disease in the plant; (2) diseases in the workmen; and (3) disabilities. Under the first heading, the doctor is called the health officer of the plant, with the duty of locating and identifying exposures, determining their importance, and initiating and maintaining control. In control of diseases, the doctor is responsible for detection of physical impairments and diseases and

References to Recent Literature - 7

"determination of their significance as actual or possible sources of disability treating them if of occupational origin, and merely reporting his findings to the workmen if the disease is non-occupational. His duties include the following types of physical examinations: pre-employment, transfer, periodical, re-entrance, and requested. He may be consulted on ailments that may or may not be related to occupation, and should conduct such consultation as if he were in private practice, but must not infringe upon the rights of the family physician. He should keep records of all examinations, consultations, reports and other information. In controlling disabilities, he should support his opinions and decisions by recognized counsel rather than carry the whole load. The decrease of 5.5% that has already occurred in the tuberculosis death rate is cited as showing that industry can help in its further reduction.

- 720 NEED FOR NATIONAL HEALTH PROGRAM. U.S. Monthly Labor Review 46, 1369-75 (June 1938).

According to a report submitted to The President by the Technical Committee on Medical Care, the annual cost of illness and premature death in the United States amounts to approximately 10 billion dollars. It is also estimated that on an average day 4 millions or more are disabled by illness and each year 70 million lose, through illness, more than 1 billion days from work. It is stated that as a nation, we are doing vastly less to prevent suffering and preserve health than we know how to do through tried and tested methods.

- 721 RELATIONSHIP OF INDUSTRIAL MEDICINE TO PRIVATE PRACTICE. C. D. Selby, M. D., Medical Consultant, General Motors Corp., Detroit, Mich. Presented before Section on Industrial Medicine and Surgery, N. Y. State Medical Society, May 12, 1938. Copies obtainable from author.

There are 3 classes of physicians practicing in relation to industry, full-time, part-time and on call. The last 2 groups are general practitioners or specialists, only incidentally serving in industry, and can be regarded as private practitioners, although they furnish service to about 85% of the industrial establishments in the United States. The basic function of industrial medicine, as exemplified by the first group, is health maintenance or preventive medicine. This function comprises industrial hygiene, physical supervision and therapy. In industrial hygiene, the plant physician assists the management in protecting the workmen against occupational diseases and diagnoses such diseases. The private practitioner in industry, if he is to fulfill those functions to any extent, must offer advice on hygiene problems or have information on where it can be obtained. In making diagnoses, he must inform himself on the patient's history. In physical supervision, the plant physician must make decisions as to the facts of exposure and of physical condition, and to refer non-industrial cases to private physicians. Regarding therapy, regular industrial physicians are moving steadily from surgery to preventive medicine, leaving them dependent upon consultants who are in reality private practitioners. The plant physician, therefore, acts as a case-finding agency, (except in occupational disease cases, which are infrequent). This trend of industrial medicine to ally itself with private practice should be encouraged. The real problem is the private practitioner in industry, the inadequacy of his service and the competition engendered with private practice. Attention is called for reforms suggested by Dr. R. G. Leland (our abstract No. 407, 1937), including among others: (1) recognition of a three fold function of medicine, public health administration, plant control, and care of sick and injured workmen; (2) acceptance of the expert in industrial health control as a specialist in medical practice; (3) formulation of criteria to determine whether certain diseases are occupational; and (4) study to accomplish a reconciliation of divergent views on choice of a physician.

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References to Recent Literature - 8

- 722 PUBLIC HEALTH SERVICES AND INDUSTRIAL HYGIENE. J. J. Buchan and D. Stewart. (2 papers). Publ. Health 51, 163-6 (1938).
This paper by a British health officer and a factory doctor cover the same general field as the paper by Sayers and Bloomfield abstracted here, in urging cooperation in the preservation of health of workers and not merely prevention of occupational diseases.
- 723 PUBLIC HEALTH ASPECTS OF INDUSTRIAL HYGIENE. R. R. Sayers and J. J. Bloomfield. J. Am. Med. Assoc. 111, 679-83 (August 20, 1938).
The authors discuss industrial hygiene as the science of the preservation of the health of workers, and relate the progress made in recent years. More attention is being given occupational diseases than any other phase of the problem, but occupational diseases account for only 8 per cent of the 2 million working hours of lost time due to compensation cases alone in 1935. On the other hand, illness causes 15 times as much absenteeism as do industrial injuries. A suggested program includes, first, obtaining complete statistics on illness of workers, followed by a study of particular industries, and finally definite recommendation for control of existing or potential health hazards. This program involves cooperation of state and local authorities, other physicians and industrialists.
- 724 WHAT EVERY HEALTH OFFICER SHOULD KNOW. INDUSTRIAL HYGIENE. Leverett D. Bristol. Am. J. Pub. Health 28, 1080-2 (September 1938).
This paper is one of a series presented at the Health Officers Section of the American Public Health Association at its annual meeting. Dr. Bristol outlines the principal developments, of which the health officer should be aware. They include: the organization and administration of several federal and state agencies; the demand for trained personnel; the extent to which state laws for occupational disease compensation have been enacted, including the states in which reporting of cases of occupational disease is required; industrial health appraisal; the organized research that is now being conducted; the Section of Industrial Hygiene of the American Public Health Association; and the results of the work on aluminum as a protector dust.
- 725 THE PHYSICIAN IN INDUSTRY. A. D. Lazenby. Ind. Med. 7, 593-8 (September 1938).
This paper is an excellent discussion of the industrial physician, not only as to his relation to industry but to his relation to national health as well. The author brings out the developments in the medical profession in recent years and the problem of the treatment of the large wage earning class of industrial workers. He cites the need for better understanding of the problem by the medical profession as a whole so that their much needed cooperation can be obtained. The field of industrial medicine is indeed growing and offers an opportunity for scientific study and advancement of the profession.
- 726 NORTHWESTERN UNIVERSITY MEDICAL SCHOOL DEPARTMENT OF INDUSTRIAL HYGIENE. Fred Fritz. Ind. Med. 7, 576-7 (September 1938).
About 2 years ago, in conjunction with the executives and medical departments of a group of industries, the Medical School established a Department of Occupational Disease. Their program, founded on practicability, includes research, case history studies, undergraduate and graduate instruction, and clinical study. The department conducts an annual occupational disease symposium.
- 727 INDUSTRIAL INJURIES AND BUSINESS CONDITIONS. M. D. Kossoris. Labor Inform. Bull. 5, 12-13 (June 1938).
The accident frequency rises and falls with employment. The author believes this may be due to several factors; one, that older and more experienced employees are kept on payrolls in bad times and it is the younger, more inexperienced

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who are most prone to accidents. Also, during slack periods, only the most efficient equipment is used and it is usually the safest. It is possible, too, that during a depression, injuries are not reported to as large an extent because of lost time and pay. The problem is, however, one of assiduous safety training of new and rehired men.

- 728 SICKNESS AND ABSENTEEISM AND MORTALITY IN MEMBER CEMENT PLANTS, 1937. A. J. R. Curtis. Portland Cement Assoc., Chicago, Ill. (June 1938).
In this 22 page mimeographed report, sickness absenteeism of 81 cement plants is analyzed and compared with similar data for 1937 by the U. S. Public Health Service. The report shows that the health of employees in the cement industry is comparable to that of any group of the same economic status. No correlation was found between the illness rate and degree of exposure to operating conditions in the plants. The death rate for tuberculosis was 0.07 per 1,000 which is 8% lower than that given by the National Tuberculosis Association for employed males from the 1930 U. S. Census.
- 729 FREQUENCY OF DISABLING ILLNESS AMONG INDUSTRIAL EMPLOYEES DURING 1932-37 AND THE FIRST QUARTER OF 1938. William M. Gafafer and Elizabeth D. Frasier. U. S. Pub. Health Repts. 53, 1562-71 (September 2, 1938). Obtainable from Supt. of Documents, Washington, D. C., for 5 cents, cash.
Records were obtained of cases of sickness and non-industrial injuries lasting 8 consecutive days or longer during 1937 for which benefits were paid to members of 29 industrial sick benefit associations, representing a total of approximately 20,000 cases for 200,000 males and 2500 cases for 17,000 females. The exact frequency of sickness and non-industrial injuries among males was 99.5 cases per 1000 as compared with 86.7 for 1932-36; for the females the corresponding rates were 151.1 for 1937 and 144.6 for 1932-36. Grippe and influenza were more prevalent in 1937 than in the average of 1932-36, 43% greater in males and 18% greater in females. There was also some indication among both sexes of an increasing trend in a number of other diseases and a decreasing trend in others, but the differences do not seem especially significant. This record is contrasted with other reports showing 1937 to be a low year in disease records, but it is pointed out that they are obtained from mortality statistics and indicate a low percentage of deaths, while the authors' figures refer to sickness and non-fatal injuries only. The frequency rate for sickness and non-industrial injuries for the 1st quarter (obtained for males only, 95.8 cases per 1000 males) was the lowest rate for that period since 1934.
- 730 DISCUSSION OF INDUSTRIAL ACCIDENTS AND DISEASES. REPORT OF 1937 CONVENTION. International Association of Industrial Accident Boards and Commissions, York Harbor, Maine. U.S. Dept. Labor, Div. Labor Standards Bull. No. 17 (1938).
The subjects covered were: legislative problems of the Workmen's Compensation Act, administration of an occupational disease law, problems of insurance, medical subjects, safety and rehabilitation, and the business meeting. Two interesting papers were those of Dr. Greenburg on the diagnosis of occupational disease and Mrs. Tousant on the choice of physicians by injured employees. Voluntary plans of insurance, the advantages and disadvantages of a State Fund, and details of Workmen's Compensation Act Administration are discussed at length.
- 731 COMPENSATION OF INDUSTRIAL DISEASES. A. Feil. Presse med. pp. 763-4 (1938). (French).
In the January 7, 1937 issue of Presse Medical, was published a list of about 100 industrial diseases that should be reported. The present list is of reportable industrial diseases that should be made compensable. The French list is

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unusual in that it includes not only the disease itself (e.g. lead poisoning) but also forms of it that are covered by insurance (e.g. lead colic, lead rheumatism, etc.), and the occupations and industries in which these clinical symptom complexes are compensated. The method by which industrial diseases are reported and compensated is given and the forms used.

- 732 WOMEN IN INDUSTRY. M. H. Kronenberg. Ind. Med. 7, 563-75 (September 1938). Women have always been employed in industry and their numbers and extent of employment has steadily been increasing. They present a separate problem which cannot be overlooked. Two important aspects of the situation are: (1) that women are known to be more susceptible to industrial poisons (as lead and benzol) than are men and (2) that care must be used in their employment both before and after childbirth, often a serious consideration. In general, they require better health provisions than do men.
- 733 THE ENGINEER'S PLACE IN INDUSTRIAL HYGIENE. Warren A. Cook. Ind. Med. 7, 551-5 (September 1938). In this paper, addressed particularly to plant engineers, the author tells of their problems, together with suggestions as to their activities. One of them is to be thoroughly acquainted with all materials used in the plant and to be informed on their possible toxic effects. He should be informed as to sources of information if he does not have the services of a plant physician. When the hazards are known it is sometimes not a difficult matter to change the process in some way or to install methods to reduce the hazards. Most industrial states have industrial hygiene departments which are usually the most available source of information.
- 734 INDUSTRIAL EXHAUST VENTILATION. CENTRIFUGAL EXHAUST FANS. John L. Alden. Heat. & Vent. 35, 6C-4 (September 1938). See note on Abstract No. 524 in our July bulletin. Because fans are rated in different terms by different manufacturers it is necessary to understand the basic considerations in order to make comparisons. Velocity, pressure, static pressure and impact pressure are defined, discussed and shown graphically in a clear manner. Power consumption, effect of density on power, and general performance curves are discussed and shown graphically as are also speed, fan size, fan types, wheel types and fan drives. The most common type of fan used in industrial exhaust ventilation is the planing mill exhaustor, a heavy rugged fan built to withstand abuse. Most manufacturers build both "standard" and "slow speed" types and the author discusses items to consider in selecting one or the other. "Slow speed" fans are larger, more expensive to operate. Noise and vibration, two objectionable features of fans, are very difficult to eliminate. Checking static and dynamic balance or insulation may reduce vibration but it is thought that the noise is caused by the passage of the blades past the cut-off in the casing. The possibilities of adapting fans to use as dust separators is briefly discussed. Centrifugal inertia concentrates particles of different sizes which can be discharged into separate outlet casings or into compartments of the same casing.
- 735 INSPECTING THE PLANT FOR HEALTH HAZARDS. Milton H. Kronenberg. Nat. Safety News 32, 33-4 78-9 (August 1938). A complete plant inspection comprises 3 phases: (1) the preliminary or visual survey; (2) an exact quantitative study of the potentialities revealed by the preliminary study; and (3) an occupational morbidity and mortality study. The scope, methods and value of each are discussed. The responsibilities of the management, the physician, the engineer, the supervisor, the employee, the nurse, and the safety director, in applying the results of a survey and in maintaining good conditions are indicated.

03117881

References to Recent Literature - 11

- 736 AIR CONDITIONING IN RELATION TO INDUSTRIAL HYGIENE. W. H. Carrier. Ind. Med. 7, 563-9 (September 1938).
Air conditioning was first developed in industry to maintain certain conditions required in the manufacture of hygroscopic products, such as textiles, tobacco and chocolate. Its principles were soon extended to controlling conditions for human comfort. In those industries in which air conditioning was installed primarily for control of product, it has been found that the conditions were also beneficial to the workers. Numerous examples are cited in which control of temperatures and humidities has resulted in better health, greater efficiency, better morale, and decreased illness. This, together with scientific research on optimum conditions, makes air conditioning an important feature of industrial hygiene.
- 737 A TEST METHOD FOR AIR FILTERS. Richard S. Dill, U.S. Bureau of Standards, Washington, D. C. Heating, Piping & Air Cond. 10, 549-51 (August 1938).
The procedure for testing air filters in use by the Bureau of Standards is described, with mechanical details.
- 738 AIR FILTER PERFORMANCE AS AFFECTED BY KIND OF DUST, RATE OF DUST FEED AND AIR VELOCITY THROUGH FILTER. Frank B. Rowley and Richard C. Jordan. Heating, Piping & Air Cond. 10, 539-48 (August 1938). Reprints exhausted.
A tentative code for testing air filters was adopted by the American Society of Heating and Ventilating Engineers in 1935, but there were a number of controversial points undecided at that time. The investigation reported was for the purpose of settling some of those points, including methods of measuring dust concentrations, preparation of a suitable synthetic dust mixture, maximum dust concentration not affecting performance of the filter, and choice of representative air velocity through the filter. Experimental details, conclusions and points on which further investigation is needed, are presented.
- 739 PROGRESS IN DUST PROTECTION. Heinz Eisenbarth. Gasmask 10, 35-8 (1938). (German).
The construction of dust filters manufactured by the Auer Company in Germany is described and illustrated by photographs and drawings.
- 740 GOOD HOUSEKEEPING FEATURES TWO-STORY FOUNDRY. Pat Dwyer. Foundry 66, 22-4 54-9 (September 1938).
Improvements made in the foundry department of the Otis Elevator Company's plant at Yonkers, N.Y., are described and illustrated by a number of photographs. All phases of good housekeeping have been considered, including the installation of exhaust apparatus of various types and manufacture.
- 741 HURON ELIMINATES DUST IN BAG HOUSE AND BULK LOADING. Rock Prod. 41, 53 (September 1938).
In the plant of the Huron Portland Cement Co., at Detroit, dust is largely eliminated from the bag house by the use of a perforated table top on which the bags are sorted. The top contains about 4000 holes and is connected to a hopper and down draft exhaust leading to a dust collector on the floor below. A similar perforated top is used in the bag repair room, also equipped with a slot which draws a continuous curtain of air past the operator's face. A suction system applicable to loading of either box or hopper cars is also described.

03117882

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

- 742 TEMPERATURE AND HUMIDITY CONDITIONS OF THE ATMOSPHERE IN MINES AT GREAT DEPTHS. J. H. Dobson and W. A. Walker. Colliery Guardian 157, 255-40 (August 5, 1938). This is a discussion of humidity and temperature conditions in deep mines from the engineering and mathematical standpoints, with brief statements of what has been accomplished in South Africa and what may be expected in the future. Among the conclusions derived by the authors is the superiority of water or brine over air as a medium to convey coolness to the points desired. Another is the importance of determining the exact location of the regions in the mine requiring priority treatment, and confining the cooling to places of actual work. All indications point to bringing mining operations up to depths of 10,000 feet and over, within the pale of economic practicability so far as mine cooling is concerned, thus tending to prolong the lives of existing mines by many years and greatly increasing the prospects of newer mining areas.
- 743 PHYSIOLOGICAL EFFECT OF PROLONGED MUSCULAR WORK. E. Andrieu and G. Trechini. Travail humain 6, 11-38 (1938). (French). The authors investigated changes in respiration and circulation when hard work is carried out in the morning after sleep and when the same work is done in the evening after a work day. After discussing the literature, the authors write of their own experiments which were made by two medical students on a treadmill. One of the students was used to cycling, the other had never done much, although this apparently made little difference in the experiments. The results showed that hyperventilation of the lung was marked during fatigue, also vital capacity, oxygen consumption and carbon dioxide given off. Acceleration of the heart during work in a fatigued condition is slight, blood pressure lowered.
- 744 THE PERMISSIBLE WORKING TIME IN HIGH TEMPERATURES AND HUMIDITIES. O. Ehrismann and A. Hasse. Arch. f. Gewerbepath. u. Gewerbehyg. 8, 611-38 (1938). (German). The authors made experiments in a conditioned room of the Berlin Hygienic Institute to test the effect of temperature and air humidity on capacity and skin perspiration. Air motion was kept low to simulate conditions in mines and the results were to be used as a basis for laws covering hours of work in mines. One skilled miner and two students served as subjects. The results are presented in a number of charts and tables. It was found that the effective temperature of Yaglou and his collaborators was better suited to determine the capacity threshold than the Kata thermometer. Taking 80% of the original capacity as the point where a decrease in work time is necessary, the authors conclude that 25°C wet bulb constitute the upper limit for the normal working time. Skin perspiration varies widely and its behavior is not reproduced regularly by the dry or wet Kata value; also agreement with the effective temperature is not predictable.
- 745 THE NEED FOR PROLONGED ARTIFICIAL RESPIRATION IN DROWNING, ASPHYXIA AND ELECTRIC SHOCK. G. Gates, R. E. Gaby and W. Machlachlan. Canadian Med. Assoc. J. 39, 120-3 (August 1938). In this short article the authors cite several examples of persons who have been revived by persistent efforts of life savers administering artificial respiration. Several persons who had been under water for periods of 9 to 25 minutes were saved. There is a classic case of a man who received an electric shock of 26,000 volts and was revived after 8 hours work by his rescuers. Great emphasis is laid on the need for immediate application of artificial respiration. The second point emphasized is that artificial respiration must be continued until the body has grown cold or rigor mortis sets in. A victim can frequently be saved even though no heart beat, pulse or respiration can be detected by a physician.

03117883

- 746 SOIL CHARACTERISTICS IN RELATION TO DISTANCE FROM INDUSTRIAL CENTERS. M. M. McCool and A. Mehlich. Contrib. Boyce Thompson Inst. 3, 353-69 (1938). Reprint available from Boyce Thompson Institute for Plant Research, 1086 North Broadway, Yonkers, N. Y.
- Soil from near the industrial centers of Philadelphia and St. Louis and vicinities was analyzed so as to obtain a possible correlation of soil content with quantity of sulfur dioxide in the atmosphere. Natural fumigations of the order of magnitude studied caused no appreciable alteration in the soil characteristics as indicated by pH values, titratable acidity, base-exchange capacity, replaceable calcium and magnesium, sulfur content and percentage of sand, silt and clay of soil. The slight acidulation of certain soils tested is much less than the acidulation due to natural processes in the soil and could be overcome by lime. It is evident from the results that soils about centers of considerable sulfur dioxide production, like St. Louis, have not been noticeably altered in spite of many years of exposure.
- 747 NITROGEN AND SULFUR CONTENTS OF LEAVES WITHIN AND AT DIFFERENT DISTANCES FROM INDUSTRIAL CENTERS. M. M. McCool and Arnold N. Johnson. Contrib. Boyce Thompson Inst. 3, 371-80 (1938). See note on preceding abstract.
- In addition to the investigations on soil characteristics, observations were made on growth conditions of vegetation in the Camden, N. J., East St. Louis, Ill., and St. Louis, Mo., regions. Nitrogen, total sulfur and sulfate sulfur were determined in leaves of several plants, varying from small weeds to trees. The total and sulfate sulfur contents were then correlated with distance from the industrial center. Nearly all the tests with the same plant on the same soil showed a slight decrease in sulfur content with increase in distance, in most cases too small to be significant, but when they are considered as a whole, the preponderance of results in the same direction indicates slight but definite correlation. Other tests have shown that the sulfur content of plants may be increased greatly without injury. There was no relationship between total sulfur content and amount of nitrogen in the leaves.
- 748 CONTROLLING LEAD EXPOSURE. R. A. Kehoe. Nat. Safety News 38, 54-6, 80-2 (September 1938).
- Although improved methods of protection have led to a decline in the death rate from lead poisoning, hygienic conditions are still bad in many small plants. It is unnecessary to make sweeping changes to secure adequate protection. An overwhelming proportion of cases of industrial lead poisoning is due to inhaled lead and atmospheric lead should be determined where there is suspected exposure. Study of absorption and elimination of lead in the body give a reliable clue to the extent of poisoning. Dangerous lead absorption sometimes occurs as the result of apparently insignificant changes in technical procedures. The industrial physician should look for sources of exposure rather than confine himself to the treatment of cases. The safe limits of exposure are not fully known, but there is apparently a point below which lead is eliminated as fast as it is taken into the system.
- 749 METHOD FOR THE ANALYSIS OF DUST AND FUMES FOR LEAD AND ZINC. Samuel Moskowitz and William J. Burke, Div. of Industrial Hygiene, N.Y. State Dept. of Labor, 80 Centre St., New York City. J. Ind. Hyg. & Toxicol. 20, 457-64 (September 1938). Reprints obtainable from senior author.
- Dithizone is the best reagent known for the estimation of lead and zinc in small quantities. The methods used are two involving colorimetric comparison and one in which titration is used. The authors favor the titration method, especially when only a few samples are to be analyzed. Their method consists in the extraction of the metal as a dithizone complex, removing the excess dithizone reagent,

03117884

decomposing the complex, and titrating the liberated dithizone against a standard lead nitrate solution. By suitable manipulation, lead and zinc can be determined in the same sample. Analyses of solutions with known amounts of lead and zinc disclose the precision of the method to be 0.001 mg. when less than 0.050 mg. of the metals is present in the original sample. Directions are given for avoiding interference by copper, tin and bismuth.

- 750 THE ABSORPTION AND EXCRETION OF LEAD ARSENATE IN MAN. Lawrence T. Fairhall and Paul A. Neal. U. S. Pub. Health Repts. 53, 1231-45 (July 22, 1938). Obtainable from Supt. of Documents, Washington, D. C., for 5 cents, cash. An investigation was undertaken in order to determine so far as possible, (1) the extent to which lead arsenate is absorbed, (2) the route by which the absorbed material is eliminated from the system, (3) the systemic effect of small amounts on man, and (4) the effect of ingested ammonium chloride plus a low calcium diet on possible storage following ingestion of lead arsenate. On account of the necessary careful experimental control, only human experimentation could be used. Each of two men ingested 100 mg. of lead arsenate over a period of 10 days while on a controlled diet. The degree of absorption, path of excretion and toxicity of the dosage were evaluated. Variations of the calcium content of the diet and the effect of change in hydrogen ion concentration as induced by ammonium chloride were noted. One significant fact is the extent to which lead arsenate is broken down within the human organism. The lead largely excreted in the feces whereas the arsenic is almost completely eliminated in the urine. A second fact of significance is that by careful physical examination and medical observation throughout, no evidence of injury to the two individuals from the ingestion of 100 mg. of lead arsenate taken over a period of 10 days was apparent. This result implies nothing as to the possibility of toxicity from massive doses or from the daily ingestion of small amounts over longer periods. The effect of the ingested ammonium chloride and low calcium diet upon the lead output was not as great as was anticipated and no simple definite conclusions can be drawn. The difference in the paths of excretion followed by the arsenic and lead shows that complete solution of lead arsenate occurs at some stages in passing through the intestinal tract.
- 751 RELATION BETWEEN LEAD POISONING, VASCULAR CHANGES AND PORPHYRIA. J. Putnoky and St. Sumegi. Arch. f. Gewerbepath. u. Gewerbehyg. 8, 570-90 (1938). (German). The authors experimented on white rats in which they induced a subacute lead poisoning (death within 2 to 4 weeks). The blood pressure changes were not striking, both rise and fall were noted. Adrenalin sensitivity was increased, usually as the period of poisoning progressed. At autopsy, they found not only a normal porphyrin content in the gastro-intestinal tract but also porphyrin in kidneys and bone marrow. A temporary concurrence of porphyrinuria and increased adrenalin sensitivity was found.
- 752 LEAD ANALYSES OF HAIR AS AN INDICATION OF EXPOSURE TO LEAD. Joseph L. Melnick and George R. Cowgill. J. Soc. Exptl. Biol. Med. 38, 899-902 (1938). The administration of lead salts to young white rats did not lead to an increased amount of the metal in the hair. In man a high lead concentration in the hair indicates that the individual was exposed to a high concentration of lead dust.
- 753 CARBON MONOXIDE HEADACHE AND ANOXEMIA. May R. Meyers. Ind. Bull. 17, 317 (July 1938). Obtainable from Div. of Industrial Hygiene, N.Y. State Dept. of Labor, 20 Centre St., New York City. It is generally agreed that most of the effects of carbon monoxide poisoning can be attributed to anoxemia, due to the depletion of blood and tissue oxygen by

03117885

the carbon monoxide. It has also been assumed that carbon monoxide headache is caused by edema of the brain resulting from anoxemia. Dr. Meyers presents arguments against the latter assumption showing that the characteristic headache is experienced when the concentration of carbon monoxide is too low to produce serious anoxemia, and that other causes of anoxemia, such as ascent to high altitudes, do not cause similar headaches. She suggests that the known greater toxicities of mixtures of carbon monoxide may to some extent account for the headache, and urges further study of poisoning by low concentrations of carbon monoxide.

- 754 CARBON MONOXIDE PSEUDO-HEMOGLOBIN, THE LATE DETECTION OF CARBON MONOXIDE POISONING AND CARBON MONOXIDE EFFECT ON THE ANIMAL ORGANISM. G. Barkan. Dtsch. med. Wchnschr. 64, 638-40 (1938). (German).

Pseudo-hemoglobins are intermediates in the course of physiological conversion of the blood pigment into bile pigment. They accompany the real blood pigment in amounts of 5% of hemoglobin. The iron in it is easily split off. The "relative carbon monoxide affinity" of pseudo-hemoglobin is significantly greater than that of hemoglobin. In the action of carbon monoxide, the checking of the total iron splitting off from the blood, in dilute acid, is really significant. This condition serves as a useful diagnostic aid in carbon monoxide poisoning; perhaps pathogenic action is also involved and can contribute to the understanding of chronic carbon monoxide poisoning.

- 755 GASES FROM CARBON ARCS; ESSENCE OF OZONE. R. W. Coltman and H. G. MacPherson. Research Laboratories, National Carbon Company, Inc., Cleveland, Ohio. J. Ind. Hyg. & Toxicol. 20, 465-7 (September 1938). Reprints probably obtainable from senior author.

In the earlier work of the authors and collaborators, the possibility of the presence of ozone in the combustion products of carbon arcs was discussed. Other investigators had apparently detected the presence of a small quantity of ozone. The authors point out a source of inaccuracy in the experiments, in that nitrogen peroxide is not removed efficiently by an alkaline permanganate solution. In experiments in which the gases were condensed under liquid air, evaporated fractionally, and examined spectroscopically, it was shown that no ozone was present. Its absence is also shown by spectroscopic examination of the mixed gases, as well as strongly indicated on theoretical grounds.

- 756 POLLUTION OF AIR BY DIESEL ENGINES. Maurin and A. Kling. Rev. petrolifere No. 763, 49-55 (1938). (French).

The carbon monoxide content in the exhaust gas of Diesel engines is very low (0.3-0.5%), at most 1.5% through intentional maladjustments of the engine. The amount of smoke and its odor are less at full load than under part load. Unburnt solids and liquids are always present in the exhaust, being in the form of lubricating oil, organic acids, aldehydes, and oxides of sulfur. Purification by means of a water bath and cyclone-type separator in series is capable of eliminating 800 gm. (79%) out of 1000 gm. of solids and liquids, the other 21% being removed with an activated carbon filter. Addition of sodium carbonate or lime to the water bath is recommended.

- 757 LESIONS OF THE KIDNEYS AND LIVER OF RABBITS POISONED BY INHALATION OF CARBON TETRACHLORIDE VAPOR. Pasteur Vallery-Rodot, G. Mauric, A. Domart and Mlle. Gauthier-Villars. Compt. rend. soc. biol. 138, 482-5 (1938).

Rabbits were allowed to breathe air containing carbon tetrachloride vapor under observation several weeks and were finally examined for lesions of the kidneys, adrenals and liver. The lesions were quite variable. Prolonged albuminuria and urobilinuria were nearly always produced.

03117886

- 758 EXPERIMENTAL CARBON TETRACHLORIDE POISONING IN THE CAT. I. INFLUENCE OF CALCIUM ADMINISTRATION. A. Cantarow, Harold L. Stewart and David R. Morgan. J. Pharmacol. 63, 153-72 (1938).
If 0.3 cc. carbon tetrachloride per kg. is injected subcutaneously, the mortality is about 33%. The hepatic lesions are described in detail. Repair is complete in the survivors in about 14 days. In a group given 2 cc. of 10% calcium glucogalactogluconate daily after the carbon tetrachloride, the mortality was reduced to half and there was much less hepatic cell disintegration and less impairment of the functional activity of the Kupffer cells.
- 759 HEALTH HAZARDS IN THE DRY-CLEANING INDUSTRY. A PRELIMINARY REPORT OF A SURVEY OF DRY-CLEANING ESTABLISHMENTS IN THE DETROIT METROPOLITAN AREA. William H. Cary, Jr., and John M. Hepler. Am. J. Pub. Health 28, 1029-41 (September 1938). Reprints probably obtainable from the Bureau of Industrial Hygiene, Dept of Health, Detroit, Mich.
This is the report of a survey of dry-cleaning establishments in and near Detroit in which the city and state Bureau of Industrial Hygiene cooperated. An interesting description of the entire dry-cleaning process and of its historical development is included. At the time that most of the present regulations were drawn, the only hazard was that of fire from gasoline, which was the usual solvent. Avoidance of fire hazards has proceeded in two directions, namely, the use of higher boiling hydrocarbons and of chlorinated hydrocarbons. The latter substances are now used very extensively, and have introduced a toxic risk. On account of expense, these solvents must be reclaimed, and wholly or partly closed systems are used, but unsafe concentrations were often found in the survey. Dermatitis, usually light, is also common. Lists of spotting agents and of mothproofing agents are included. Many of these also involve hazardous exposures. Other hazards of the industry are unnatural postures, tenovitis, excessive humidity, moisture, heat and carbon monoxide, but they are of minor significance in comparison with vapor exposures. There is little legal regulation of the present hazards of this industry.
- 760 CHLORACETYLENE SOLVENTS. TOXICOLOGY OF TRICHLOROETHYLENE AND OF TETRACHLOROETHANE. Gasq. Bull. trav. soc. pharm. Bordeaux, 75, 70-101 (1937). (French); Chimie et Industrie. 38, 101. (French).
Acute intoxication due to trichlorethylene manifests itself in many by narcosis and loss of equilibrium and of sensitiveness. Postmortem examination shows a generalized congestion of all the organs. Chronic intoxication produces nervous disturbances: paralysis of trigeminal and optic nerves and polyncuritis. The toxic dose has not yet been definitely established, but it would seem that a limit of 5 mg. per liter should be set as the maximum trichlorethylene concentration of industrial atmospheres. Tetrachlorethane also produces narcosis. Its prolonged action manifests itself by gastric troubles and icterus, frequently severe. It acts also on the nervous system. Industrial atmospheres should not contain more than 1 mg. tetrachlorethane per liter.
- 761 CASE OF SEVERE ACUTE NEPHRITIS FROM INHALATION OF CARBON TETRACHLORIDE. Pasteur Villery-Radot, G. Mauric and A. Bonnard. Bull. et mem. Soc. Hop. 54, 803-9 (1932). (French).
A woman who used carbon tetrachloride at home for cleaning, fell ill with nausea, vomiting, back ache and oliguria. On the 23rd and 24th days after the poisoning, she produced only 60 cc. urine (for the 2 days altogether). From the 6th day her condition had improved after injections of hypertonic sugar solution; the diuresis increased gradually. After a month she left the hospital and eventually was completely cured. In the discussion, Boidin reports on severe nephritides one fatal, among 5 young people who had sprayed themselves, in a moment of exuberance, with a fire extinguisher containing carbon tetrachloride.

HHS-0007984

03117887

- 762 TRICHLOROETHYLENE. National Safety Council, Industrial Data Sheet D-Chem. 27. Nat. Safety News 37, (March 1938). Obtainable from National Safety Council by its members for 5 cents.
- The principal hazard of trichlorethylene is that of poisoning by inhalation of its vapor. It does not normally decompose in the presence of water and of the common industrial metals. However, in contact with open flames, arcs, or lighted tobacco, the vapor decomposes with the formation of toxic and corrosive substances such as hydrochloric acid and phosgene. The vapor is toxic, but is less so than those of most other chlorinated hydrocarbons. One state has set the maximum allowable concentration at 300 parts per million. It is believed that a concentration detectable by odor constitutes a health hazard. The action of trichlorethylene is apparently not cumulative, and under normal conditions and reasonable precautions, it may be used with safety. Its anesthetic effects are similar to those of chloroform and carbon tetrachloride, but it does not seem to cause fatty degeneration of the liver. Temporary exposure to high concentrations has caused irritation and digestive disturbances, usually of short duration. Contact with the skin may cause it to be dry and cracked, and also produce the same effects as inhalation. In case of poisoning, the patient must be removed to fresh air, and artificial respiration with carbon dioxide-oxygen mixtures should be administered if necessary. A physician familiar with the treatment should be consulted.
- 763 CASES OF TRICHLOROETHYLENE POISONING WITH SPECIAL REFERENCE TO CHEMICAL CLEANING WORKS. E. Schiøtz. Nordisk Med. Tidsskr. 15, 308-13 (1938). (Norwegian). Described are the extensive uses of this compound in industry, its importance in industrial hygiene, and also the usual clinical pictures presented in this form of poisoning. In the years 1932-35, only 4 cases of trichlorethylene and 2 cases of carbon tetrachloride poisoning have been notified to the Factory Inspection Board of Norway. Further investigations disclosed, however, that many cases had occurred but had not been reported. In 18 cleaning plants "tri" poisoning was detected in 13 persons and 16 were found to have previously been poisoned one or more times. In most cases the poisoning was slight although some of the symptoms found were temporary dysarthria, loss of memory, narcomania (craving for trichlorethylene), emaciation and eczema. The usual symptoms were feeling of inebriation and languor as well as sleepiness after the day's work. Norwegian doctors are now obliged to report cases of poisoning by halogenated hydrocarbons of the aliphatic series since they are included among the compensable occupational diseases.
- 764 TOXICITY OF ETHYLENE IMINE. J. P. Danchy and D. J. Pflaum. Ind. & Eng. Chem. 3, 778 (July 1938).
- Doses of 0.03 gm. of ethylene imine hydrochloride per kgm. of body weight causes death to guinea pigs in 10 hrs., 0.1015 gm. in 24 hours. The authors' experiences show that the vapors (concentrations not given) if inhaled for 2 to 3 minutes are definitely toxic to humans. There are no immediate symptoms but vomiting begins about 2 hours after exposure. Buccal epithelium becomes inflamed and edematous, and the eyes are very much inflamed. After 1 or 2 days the symptoms disappear entirely. Two drops of the imine dissolved in 0.5 ml. water were injected into a cat. Within an hour the hind quarters were paralyzed and in 10 hours the animal died. Autopsy showed stomach and kidneys to be alkaline in reaction.
- 765 PREVENTIVE ACTION AND THERAPY WITH LECITHIN AND CHOLESTERIN IN ANILINE POISONING. C. Bellasini. Med. del lavoro 29, 104-16 (April 1938). (Italian). Experiment 1 studies on the pathology of acute aniline poisoning in rabbits are discussed. The results obtained indicate that lecithin and cholestrin are

03117888

helpful. The author claims that these substances by some action neutralize the effect of aniline. Aniline was given subcutaneously in amounts of 1.5 gm./kg. resulting in death to the animals.

- 766 ACUTE INTOXICATION WITH ANILINE OIL. Giuseppe Castrovilli. Risc. med. appl. lavoro ind. 9, 107-15 (1938). (Italian).
A description of the case of acute intoxication produced by an insecticide containing o- and p-toluidine. The patient was treated with subcutaneous injections of oxygen.
- 767 PRIMARY CANCERS OF THE LUNGS OF MICE CAUSED BY THE LIGHTER OILS OF COAL TAR. André Kling, Nicholas Samsonow and Marguerite Haros. Compt. rend. 196, 1868-70 (1938).
A particular light coal tar oil, boiling at 75-100°C, produced acute toxic symptoms when rubbed on the skin of mice. When diluted 1 to 10 in Nujol it could be applied repeatedly without causing too many severe attacks. In an experiment in which the solution was rubbed on the backs of 80 mice twice a week for 3 months, 37 mice succumbed after pulmonary inflammation, the first pulmonary cancer appeared in 50 weeks, and 13 of the 3 survivors died later with pulmonary cancers. No skin lesions appeared. A fluorescent substance obtained from the oil by chromatographic methods was identified as benzopyrene.
- 768 BENZENE IN THE PAINT AND VARNISH INDUSTRY. Walter Meyer. Farbe u. Lack. 1938, p.39. (German).
This review emphasizes preventive measures for avoiding poisoning by benzene.
- 769 HAZARDS INCIDENTAL TO INDUSTRIAL USES OF NITROCELLULOSE LACQUERS. William J. Burke and Leonard J. Goldwater. Ind. Bull. 17, 314-6 (July 1938). Reprints obtainable from Div. of Industrial Hygiene, N.Y. State Dept. of Labor, 30 Centre St., New York City.
The ordinary nitrocellulose lacquer contains 5 basic ingredients: (1) nitrocellulose, (2) solvents and diluents; (3) gums or resins; (4) softeners or plasticizers; and (5) pigments or coloring material. The volatile ingredients constitute about 60% by weight of the total. Each ingredient is discussed with reference to its toxicity. The solvents include ester solvents, ketones and ethers, and the diluents which are not solvents in themselves comprise benzine (petroleum naphtha), benzol or benzene, toluol, xylol, solvent naphtha and alcohols. Benzene, ethylene glycol and the alkyl glycol acetates are the most poisonous of the substances whose toxicity is known. The plasticizers, gums and resins are in general non-toxic under the conditions of use. Among the pigments those containing lead are the only ones to be feared. Most of the potential hazard, then, both in toxicity and inflammability, arises from the solvents and diluents. The most effective means of control of both fire and health hazards is adequate ventilation. Hose or pressure type masks may be necessary in addition to, but not as a substitute for proper ventilation. Various types are suggested, depending upon the particular process. The use of properly designed spray booths has become the standard method for ventilating spray work. The three types, the cabinet, canopy and tunnel booths, meet varying conditions and the type and details must be adapted to the particular operation. Good house-keeping is essential, especially in view of the fire hazard.
- 770 ACETIC ACID. National Safety Council. Industrial Data sheet D-Chem. 39, N.Y. Safety News 53, 36 (September 1938). Obtainable from National Safety Council by its members at 5 cents.
The principal hazards involved in work with acetic acid are inhalation of its vapors, swallowing of the liquid or crystals, and contact of the liquid or

03117889

crystals with the skin or eyes. The acid has varied uses and is shipped in aluminum or stainless steel tanks or barrels and glass carboys. Inhalation of the vapor irritates the membranes of the nose and throat. The vapor also has an irritating action on the eyes and skin. When the acid is swallowed, the action is painful to all tissues in contact with it. The fatal dose is not definitely known, but swallowing of 2 tablespoonfuls has caused death in adults. An emetic should be used in case of swallowing and the skin should be thoroughly washed in case of contact. A physician should be called. Preventive measures include: (1) avoidance of contact with sodium peroxide or chrome or nitric acids; (2) use only in closed systems or with adequate exhausts; (3) respiratory and other personal protection; (4) prohibition of eating in exposed rooms; and (5) cleanliness.

- 771 **EXPERIMENTAL VANADIUM POISONING IN THE WHITE RAT.** L. P. Daniel and R.D. Lillie. U.S. Pub. Health Repts. 53, 765-77 (May 13, 1936). Sodium metavanadate in amounts to give 11.5, 23, 32, 164, and 368 p.p.m. respectively, of vanadium in the ration of rats produced toxic symptoms at the three highest levels. The animals receiving 11.5 and 23 p.p.m. showed no gross symptoms of poisoning. Deaths occurred in the group given 368 p.p.m. of vanadium. Doses of 2 to 4 mg. of vanadium administered daily by means of stomach tube caused death in rats weighing less than 300 gm. in two to four days; heavier rats lived slightly longer. There was no evidence of a cumulative effect. Provided daily tolerance was not exceeded, rats given a total quantity far in excess of lethal dosage lived for weeks in a normal condition. Symptoms of acute poisoning are nervous reactions, hemorrhagic exudate from the nose and intestines, marked diarrhea, paralysis of hind legs, and labored respiration. Chronic effects are about the same to a less marked degree.
- 772 **BERYLLIUM (GLUCINIUM).** J. G. Galman. Occupation and Health, Supplement, International Labor Office, Geneva (January 1936). (One of the supplements mentioned in News section of this bulletin) The author considers the properties, uses, industrial processes, sources of risk, toxic action, pathology, hygiene and therapy. Up to the present time, this element has not been important in industrial hygiene in the United States but it apparently is being used more and more in Europe.
- 773 **CHRONIC INTOXICATION WITH MANGANESE.** Michele Dragonetti. Rass. med. appl. lavoro ind. 2, 94-106 (1932). (Italian). A review of the literature on chronic manganese intoxication is accompanied by the clinical description of a case. The author suggests the inclusion of this form of poisoning among the occupational diseases. A bibliography is included.
- 774 **DEATH FROM NITROUS GASES.** Keicher. Arbeitsschutz, pp. 99-100 (1933). (German). Two men were cleaning brass rings with nitric acid, one dipping them into the acid, the other drying them later with sawdust. The work was carried on in an otherwise idle foundry building and the weather was extremely cold. Nitrous fumes evidently arose from the drying operations as this man later died of poisoning by nitrous gases. The other man was only slightly ill.
- 775 **INJURY OF THE EYE BY HYDROGEN SULFIDE IN THE REFINERY.** V. A. Lichtner. Vestnik Ophth. 11, 256 (1937). (German). The injuries caused by hydrogen sulfide usually involve the conjunctiva and occasionally the cornea. In the presence of the gas in the atmosphere in a concentration of 1 mg. per liter, the subjective symptoms appear at the end of the working day and reach their maximum intensity 4 or 5 hours later. In treatment, Monin affords relief but cocaine, because of its effect on the cornea,

HYBB-0007987

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epithelium, is contraindicated. The authors urge improvement in technical equipment and construction of the plant in order to eliminate leakage of gas and to improve ventilation.

- 776 THE EFFECT OF ARSENIC ON THE TOXICITY OF SEDIMENTOUS GRAINS. A.L. Moson. Science 88, 81 (July 11, 1934).
Comparative studies of the toxicity of selenium, tellurium, arsenic, vanadium, nickel, tungsten and molybdenum have shown that at the concentrations used, selenium was the only one to cause severe liver lesions in the rats. Rats fed sedimentous grain do not develop the characteristic symptoms when 8 p.p.m. arsenic as sodium arsenite is added to their drinking water. This amount of arsenic protects against 15 p.p.m. selenium. Half this amount of arsenic gives only partial protection. The arsenic seems to give protection against inorganic as well as organic selenium. It is hoped that a non-toxic substance other than arsenic will be found having the same protective action.
- 777 INDUSTRIAL ARSENIC SKIN INJURY IN VINEYARD WORKERS. A. M. tracc. Arch. f. Dermatol. u. Syphil. 146, 606-17 (1934). (German).
After reviewing the literature, the author reports on three cases of chronic arsenic poisoning in vineyard workers. For several years all had sprayed or dusted arsenous insecticide, although only seasonally (one for only 3 days in each of the last 3 years). All showed arsenic melanosis and keratosis, only one polyneuritis of slight degree in the femoral and peroneal region on both sides, as well as hyperaesthesia. In this latter case, about 1-1/2--2 months after beginning work, there was found 94 microgram 3 arsenic in the urine. Since examination of the wine (which was drunk freely by the patients) showed no arsenic, the occupational cause of the poisoning was certain.
- 778 THE EFFECT OF CHLORIN ARSENATES ON THE LIVER. W. C. von Glahn, F.B. Flinn, and F. Klein, Jr. Arch. of Path. 45, 401-506 (April 1933).
Series of experiments were performed on rabbits, rats and ferrets to determine the effects upon the liver of cupric and lead arsenates--the arsenates most commonly used in insecticides on fruits and vegetables--and the protection provided by a high carbohydrate diet. Sodium arsenite was used as a control against the copper and lead. Of the 46 rabbits to whom the arsenates were administered, 4 or 9% developed cirrhosis of the liver. Recent or healed necrosis was found in 31 livers and necrosis confined to single cells in 4. Phagocytes in varying numbers and pigmentation were found in 31 livers. In 29 of these, the pigment gave a positive reaction for iron. Nine of the rabbits showed clinical jaundice. Rats and ferrets gave consistently negative results, indicating a higher resistance to the arsenates. The authors conclude that lead, copper and sodium arsenates produce similar necrosis in livers of rabbits and that the feeding of these decreases results in cirrhosis. They believe the action is due solely to arsenates. In rabbits fed a rich diet of carbohydrates (bread and potatoes), the incidence was only 9%, indicating a protective action of some sort not completely explainable. Interestingly enough, they found the largest average quantities of lead, copper and arsenic in animals in this series. The histological appearance of the liver cells indicated there was more glycogen in these cells in the rabbits on high carbohydrate than in those on a low carbohydrate diet.
- 779 METHODS FOR THE DETECTION OF TOXIC GASES IN INDUSTRY. II. HYDROGEN CYANIDE VAPOR. Department of Science and Industrial Research. H.M. Stationery Office, London, 1934.
This is the second in a series of 12 booklets on simple methods for detection of dangerous gases in small quantities, developed by the British Government in

HWB-0007988

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cooperation with the Association of British Chemical Manufacturers. The first on hydrogen sulfide, was described in our November, 1937 bulletin, No. 569.

A concentration of 1 part in 80,000 of hydrogen by nitrate will give slight symptoms after several hours, 1 part in 10,000 is dangerous within one hour and 1 part in 500 is rapidly fatal. The methods described here will detect concentrations down to 1 part in 100,000. Two methods are described, the "magnifying-glass" test and the Congo Red-silver nitrate test. and in each case the air is drawn through paper impregnated with the proper reagents. In the first method, the reagents are potassium tellurite and copper acetate and in the second, mixture of Congo Red and silver nitrate. The intensity of the strains are compared with standards to determine the concentrations.

- 770 REPORT ON THE INVESTIGATIONS CARRIED ON IN THE SCHNEEBURG DISTRICT BY THE AUTHORIZATION OF THE GOVERNMENTAL COMMISSION FOR THE FIGHTING OF CANCER. Ztschr. Krebsforsch. 47, 109-11 (1938).
Cancer of the lung has long been known to be frequent among Schneeberg miners, and this paper describes a program of an exhaustive study being made to determine under what conditions it occurs.
- 781 EXPERIMENTAL STUDIES ON THE QUESTION OF THE SCHNEEBURG CANCER OF THE LUNG. H. Lohmann. Ztschr. Krebsforsch. 47, 99-99 (1938).
The author reports experiments in which 100 mice were kept in a Schneeberg mine and survived 1 to 370 days. Most of the animals died from respiratory infections. In 7 animals tumors were found, multiple in 3 cases. Controls are not mentioned, but the mice were from a stock not known to exhibit much spontaneous carcinoma. As Schmidtman has ruled out arsenic in the ore as a cause of the Schneeberg lung tumor, the author thinks that in the mice, as in the miners, radium emanation may be the cause.
- 782 EFFECT OF FEEDING SOILED YEAST ON EXPERIMENTAL CANCER. J. Maisin, Y. Pourbaix and P. Ceyssens. Compt. rend. Soc. Biol. 137, 1477-8 (1938). (French).
Feeding large amounts of cooked yeast greatly decreased the incidence of cancer in mice treated with benzopyrene. In possible explanation it is suggested that the yeast supplies an "antistyril" in which cancer tissue is deficient.
- 783 INFLUENCE OF VERY SMALL DOSES OF DIFORMALDEHYDE PEROXIDE ON THE DEVELOPMENT OF BENZOPYRENE CANCER IN MICE. J. Maisin, Y. Pourbaix and P. Ceyssens. Compt. rend. Soc. Biol. 137, 1479-81 (1938).
A 0.001 solution of diformaldehyde peroxide, injected in 0.5 cc portions bi-weekly, hastened the development of benzopyrene cancer in mice. On the other hand, concentrations of 10^{-5} to 10^{-18} had an inhibiting action, most noticeable with a 10^{-9} solution.
- 784 THE EFFECT OF 1,2,5,6-DIBENZANTHRAcene ON THE GROWTH OF BROWN-PEARCE RABBIT CARCINOMA. Max Appel, Alfred A. Surana, G. Kolischer and H. Nechaes. Am. J. Cancer 33, 749-55 (1938).
A 0.1% solution of dibenzanthracene in benzene was injected subcutaneously, in 5 cc. doses, three times a week for 6 weeks before transplantation and thereafter until the death of the animal. In the treated rabbits the carcinoma grew more rapidly and metastasized more extensively than in the untreated controls. Treatment with dibenzanthracene appeared to cause increased susceptibility or changed disposition to tumor growth.

03117892

References to Recent Literature - 45

- 785 INDUCTION OF TUMORS BY 3,4,5,6-DIBENZOCARBAZOLE IN MICE OF THE C 57 STRAIN WHICH DEVELOP SPONTANEOUS HEPATOMA. L.C. Strong, G.W. Smith and R.U. Garner. Y. L. J. Biol. & Med. 10, 335-38 (1939).
A benzene solution containing 0.1% 3,4,5,6-dibenzocarbazole painted on the skin of mice induced a variety of pathological lesions, local and distant. Injection of 1 mg. dissolved in sesame oil also produced a reaction at the site of the injection and a lowgrade inflammation in the liver. The substance showed no estrogenic activity in the mouse.
- 786 CONTACT DERMATITIS. Michael H. Mart. Ind. Med. 1, 552-64 (September 1939).
Contact dermatitis, constituting 30 or 60% of compensable industrial diseases, is a very important part of the work of the industrial physician. The causes can be classified into two types: direct irritants and allergens. In the first type are such substances as acids, alkalis, metal salts, certain chlorine compounds, industrial solvents and many others. In the allergens, some substances as plant oils, certain dyes, and numerous organic substances produce dermatitis only in certain susceptible individuals. Of the two types, the first is probably the most important. The author discusses the subject in general and stresses persistent cases which fail to clear up after discontinuing the operation. Correct diagnosis is necessary and its importance is also stressed.
- 787 CHRONIC TRAUMA IN TREATMENT OF ACCIDENTS. G. Magnus. Med. Klin. 34, 529-31 (1939). (German).
Cases of chronic trauma are not legally considered as accidents in most countries but are often compensated as industrial diseases. Some examples are: sorels of work with compressed air tools, shovel sickness, and "marching sickness." Another example, specifically mentioned, is injury to the meniscus of the knee which can develop from even moderate use of the knee. Microscopic examination of the meniscus discloses severe degenerative changes in the cartilage as a result of chronic trauma, especially among miners, floor layers, terrazzo workers and others.
- 788 KERATITIS FROM WORKING WITH CREOSOTE. G. F. Birdwood. Brit. Med. J. pp. 18 (July 1, 1939). (British).
Two cases are reported of gardeners who experienced keratitis after using creosote to spray upon fences. They came under observation after the acute stage had subsided. In one of the men the left eye had three small gray maculae below the pupil and numerous small gray spots on the cornea. There was permanent impairment of vision. In the other case the left eye was also affected. On each side of the pupil was a small gray macular patch with numerous small gray specks and superficial hazy keratitis. The condition caused a hazy vision. When drops of creosote got into the eyes they caused intense irritation and great pain.
- 789 SKIN DISEASES FROM LUBRICATING OIL. A. Feil. Progres Med. 66, 757 (1935). (French).
For oil used to develop, the author considers it necessary for the oil to soften the epidermis and especially to render it non-resistant on warm days. In addition, it is necessary for dust and metal particles to be present in the oil and for bacteria to be present on the skin. He reports on an epidemic of skin irritations involving oil and an infected wound although no injurious substances could be found in the oil. The trouble did not disappear when the oil was changed, but when cold weather came.

03117893

HW88-8887990

References to Recent Literature - 23

- 790 SAFECOAT INSULATING MATERIAL. J. Am. Med. Assoc. 110, 1771 (May 21, 1938).
An electrician develops a dermatitis on hands and arms when working with wires fireproofed with "Safecoat." Other types of insulation do not affect him. The reply points out that many of the chemicals used may be responsible for the skin eruption, perhaps chlorinated naphthalene or chlorinated diphenyl which may also cause serious systemic disease.
- 791 DISEASE OF THE SKIN AND FINGER NAILS FROM INDUSTRIAL CONTACT WITH ORGAN KEYS OF GALALITH. C. Simon. Bull. Soc. franc. de Dermatol. et Syphil. 614-7 (1938). (French).
The author describes the disease of a 24 year old woman who developed eczema of the fingers and hands after playing an organ with galalith keys. By rubbing galalith on the finger tips, eczema could be induced. A button manufacturer reported to the author that he had frequently seen eczema among workers using galalith, especially those who softened it with steam.
- 792 TWO CASES OF OCCUPATIONAL SKIN DISEASE IN FLOWER HANDLERS. H. Rabeau and Ukrainczik. Bull. Soc. franc. Dermatol. Syphil. 595-7 (1938). (French).
In one case eczema which had appeared on the hands and fingers had been present for 13 years. It disappeared during vacations but the cause could not be ascertained. In the second case it was shown by skin tests that there was hypersensitivity to tulips (flowers, leaves, stalks) and since desensitization was attempted in vain, the handling of tulips was discontinued.
- 793 INJURY TO THE SKIN BY ETHYLENE BROMIDE, A CONSTITUENT OF FLUID FROM A WATER-LEVEL INDICATOR. G. Plessier. Arch. f. Gewerbepath. u. Gewerbehyg. 8, 591-600 (1938). (German).
A careful investigation made in connection with a skin injury of a stoker caused by fluid from a water-level indicator showed that the fluid contained ethylene bromide. After prolonged exposure it caused a local irritation and marked general symptoms in one of nine experimental subjects.

NEWS NOTE

Mr. Henry D. Sayer, who has been a member of the Board of Trustees of Air Hygiene Foundation, representing the Association of Casualty and Surety Executives, has resigned his position to accept a post with the New York State Insurance Fund. In assuming his new duties Mr. Sayer takes with him the good wishes of Air Hygiene Foundation.

03117894

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UNITED STATES AIR FORCE

WASHINGTON, D.C.