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Industrial Hygiene Digest

INDUSTRIAL HEALTH NEWS

LITERATURE ABSTRACTS

MEDICAL

ENGINEERING

CHEMICAL

TOXICOLOGICAL

LEGAL

MARCH, 1960

(Vol. 24, No. 3)

INDUSTRIAL HYGIENE FOUNDATION

MELLON INSTITUTE

4400 FIFTH AVENUE -:- PITTSBURGH 13, PA.

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INDUSTRIAL HYGIENE FEATURES

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For a discussion on periodic health examinations and the nature of newly discovered diseases in executives see Abst. No. 219.

Present-day teaching and training of direct artificial respiration is the topic of Abst. No. 221.

See Abst. No. 227 for an interesting study on the toxemia of burns.

Details on the percutaneous absorption of toxic substances are given in Abst. No. 228.

A case of fatal nephropathy during edathamil therapy in lead poisoning is described in Abst. No. 235.

Freon as a cause of poisoning is the title of Abst. No. 238.

Considered in Abst. No. 245 are the current pathological aspects of pneumoconiosis.

Information on the inhibitory effect of iron in experimental silicosis is given in Abst. No. 249.

Abst. No. 252 is concerned with the biological effects of glass dust.

The measurement of radioactivity in air filters is the subject of Abst. No. 270.

For the effects of air pollution on the eye see Abst. No. 279.

The investment value of management health examinations is evaluated in Abst. No. 295.

FOUNDATION FACTS

NEWLY APPOINTED MEMBERS OF I-H-F TECHNICAL COMMITTEES

<u>Legal</u>	Oliver Clayton, Esso Standard Oil Company W. C. Hartman, Squire, Sanders & Dempsey James J. Regan, The Self-Insurers Association
<u>Medical</u>	Dr. Carl U. Dernehl, Union Carbide Corporation Dr. Robert B. O'Connor, United States Steel Corporation Dr. Paul J. Whitaker, Allis-Chalmers Manufacturing Company
<u>Engineering</u>	Lester V. Gralley, Aluminum Company of America H. W. Speicher, Westinghouse Electric Corporation
<u>Chemical- Toxicological</u>	H. R. Hoyle, The Dow Chemical Company Clyde C. Ruddick, Pittsburgh Plate Glass Company Joseph F. Treon, Atlas Powder Company

TRANSACTIONS OF 24th ANNUAL MEETING of Industrial Hygiene Foundation held in Pittsburgh, Pa., on October 28-29, 1959, have been published as the complete March, 1960 issue of the AMA Archives of Industrial Health. Copies of these Transactions are now being sent to all members of the Foundation.

TWO NEW REPRINTS. "Experimental Silicosis: The Inhibitory Effect of Iron", by Paul Gross, Marian L. Westrick, and James M. McNerney. Diseases of the Chest, Vol. XXXVII, No. 1, Jan. 1960; and "Current Concepts of Pneumoconiosis", by Paul Gross. J. American Medical Assoc., Vol. 179, 546-549, Feb. 6, 1960. These reprints are available from the Foundation upon request.

SILVER ANNIVERSARY MEETING

OCTOBER 26-27, 1960

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INDUSTRIAL HYGIENE DIGEST
Literature and News

NEWS ITEMS

202 1960 Industrial Health Conference.

This conference will be held April 24 through 28 in the Community War Memorial Auditorium, in Rochester, New York. The following organizations will participate: Industrial Medical Association, 45th Annual Meeting, April 26-28; American Association of Industrial Nurses, 18th Annual Meeting, April 26-28; American Industrial Hygiene Association, 21st Annual Meeting, April 25-28; American Conference of Governmental Industrial Hygienists, 22nd Annual Meeting, April 24-27; and American Association of Industrial Dentists, 17th Annual Meeting, April 25-27.

203 American College of Physicians.

The American College of Physicians will present a postgraduate course on the "Early Detection and Prevention of Disease," May 9-13, 1960, at Philadelphia, Pennsylvania. The course will constitute a critical evaluation of the possibilities and techniques for the prevention or the early diagnosis of disease, and should be particularly valuable for physicians in industry who have responsibilities for the performance or supervision of periodic health maintenance examinations. Norbert J. Roberts, M.D., and John P. Hubbard, M.D., are co-directors of the course. It will be conducted by members of the faculties of several schools of medicine in Philadelphia and New York, and by staff members of various clinics and occupational medical services in the area. Registration will be limited to 100. The cost for members of the American College of Physicians is \$30; for non-members, \$60. Those who wish to register should do so directly with the American College of Physicians, 4200 Pine Street, Philadelphia 4, Pennsylvania. -- J. Occ. Med.

204 American Trudeau Society.

The American Trudeau Society announces a Postgraduate Course: "The Measurement of Pulmonary Function in Health and Disease," sponsored by the Medical Schools of Harvard University, Tufts University and Boston University, Harvard School of Public Health, Massachusetts Tuberculosis and Health League, and the Massachusetts Trudeau Society. This course aimed at physicians interested in diseases of the chest who wish to acquaint themselves with the methods used in the evaluation of pulmonary function will be presented for the tenth successive year at the Boston City Hospital, March 21-25, 1960. The methods used in the evaluation of pulmonary function and related cardiac function will be demonstrated. The tuition is \$75. Applications and more detailed information may be obtained from the chairman of the course: Edward J. Welch, M.D., 1101 Beacon Street, Brookline 46, Massachusetts.

205 Biology News Bureau.

The American Institute of Biological Sciences announced recently establishment of the Biology News Bureau as a new activity to serve biologists and professional organizations in the biological sciences. Dr. Hiden T. Cox, Executive Director, said the bureau is organized as a department of the Institute and has the assignment of smoothing flow of information between the biological professions and the public. Dr. Cox said Harold F. Osborne has been

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named director of the bureau. Osborne formerly was a science writer for the Seattle Times, an editor and correspondent for the Associated Press and on the information staff of the Veterans Administration. The Biology News Bureau has offices at the American Institute of Biological Sciences headquarters, 2000 P Street, N.W., Washington 6, D.C.

206 Noise Abatement Digest.

A new publication of the National Noise Abatement Council, made its first appearance recently. The bi-monthly Digest presents a non-technical summary of news and developments in the area of noise abatement and suppression. It is sent to members of the Council and is available to non-members on subscription at \$5.00 per year from the Council at 51 East 42nd Street, New York 17, New York.

-- Noise Control

207 Hygienic Guide Series.

The following Hygienic Guides are now available: Hydrogen Selenide, Antimony and Its Compounds (excepting Stibine), Styrene Monomer (Phenylethylene), and Ethylenediamine. They are given in the December AIHA Journal (pp. 514-518) and can be obtained from the American Industrial Hygiene Association, 14125 Prevost, Detroit 27, Michigan, at 25 cents each.

OCCUPATIONAL DISEASE STATISTICS

208 Occupational Disease Statistics. (Cases reported to the respective Health Departments.)

	Conn. Dec.	Pa. Jan. -Feb.	Tenn. Jan. -Feb.	Total
Anthrax		1		1
Asphalt mastic fumes			1	1
Asthma		1		1
Carbon disulfide poisoning			1	1
Chemical intoxication		4		4
Chlorine gas poisoning			1	1
Dermatitis	42 *	29	14	85
Fumes (unidentified)		5		5
Lacquer poisoning			1	1
Lead poisoning		1		1
Paresis		1		1
Pneumoconiosis		4		4
Pneumoconiosis (suspected)		9		9
Poisoning (arsenic)	1			1
Respiratory irritation		2		2
Silicosis		43		43
Silicosis (suspected)		4		4
Tuberculosis		1		1
Total	43	105	18	166

* Causes are listed as follows:

Connecticut: Solvents (N.O.C.), 8; oils, fats, and waxes, 6; synthetic resins and chemicals, 6; plating solutions (N.O.C.), 4; soap solutions, glue, etc., 4; chemicals (N.O.C.), 3; infections, 3; undetermined, 3; abnormalities of humidity, abnormalities of temperature, alkalies, dust-inorganic, and ethylene trichloride, 1 each.

COMING EVENTS

- 209 Mar. 28-Apr. 1 Greater New York Safety Council, 30th Annual Safety Convention and Exposition. New York, N. Y.
- Mar. 31-Apr. 2 American Gastroenterological Association, New Orleans, La.
- Apr. 1-3 American Society of Internal Medicine, San Francisco, Calif.
- Apr. 3-6 American Surgical Assoc., White Sulfur Springs, W. Va.
- Apr. 4-5 Industrial Accident Prevention Assoc., Annual Conference, Toronto, Ont.
- Apr. 4-7 1960 Nuclear Engineering and Science Conference, 8th Atomic Energy in Industry Conference, 6th International Atomic Exposition, New York.
- Apr. 5 Instrument Society of America, New Jersey Section, Symposium on Computers in the Process Industry, Newark, N. J.
- Apr. 5-14 American Chemical Society, 137th National Meeting, Cleveland, Ohio.
- Apr. 7-8 9th Southern Municipal and Industrial Waste Conference, Raleigh, N. C.
- Apr. 8-12 American Dermatological Association, Boca Raton, Fla.
- Apr. 11-12 Inter-Society Color Council, 29th Annual Meeting, Philadelphia, Pa.
- Apr. 11-15 American Association of Immunologists, Chicago, Ill.
- Apr. 11-15 American Physiological Society, Chicago, Ill.
- Apr. 11-15 American Society for Experimental Pathology, Chicago, Ill.
- Apr. 11-15 Federation of American Societies for Experimental Biology, 44th Annual Meeting, Chicago, Ill.
- Apr. 11-16 American Association of Anatomists, New York, N. Y.
- Apr. 11-16 American Society of Biological Chemists, Inc., Chicago, Ill.
- Apr. 13-15 American Public Health Assoc., Southern Branch, Memphis, Tenn.
- Apr. 19-21 14th Annual Meeting of the Research and Development Associates, Food and Container Institute, Chicago, Ill.
- Apr. 20-22 National Petroleum Assoc., Semi-annual Meeting, Cleveland, Ohio
- Apr. 20-22 3rd Conference on Biological Waste Treatment, New York, N. Y.
- Apr. 25-28 American Physical Society, Washington, D. C.
- Apr. 25-30 American Academy of Neurology, Miami, Fla.
- Apr. 28-30 American Assoc. of Pathologists and Bacteriologists, Memphis, Tenn.
- Apr. 29 Parenteral Drug Association, Philadelphia, Pa.

LEGAL DEVELOPMENTS

210 Radiation Protection Act. (Illinois Rev. Stat. Ch. 111 1/2 Sections 211-229).

The Radiation Protection Act provides for the "regulation of the uses of sources of ionizing radiation which are or may be detrimental to health." Section 7 of this Act creates a Radiation Protection Advisory Council of 7 members. Section 8 provides that the Department of Public Health shall administer the Act and among other duties: "Develop comprehensive policies and programs for the evaluation and determination of exposures associated with the use of radiation, and for their control; review and approve plans and specifications for radiation installations and radiation sources; inspect and test radiation installations and radiation sources, to determine whether or not any radiation resulting therefrom is or may be detrimental to health." The Department of Public Health may order the discontinuance of violation. This Act was approved and became effective July 17, 1959. -- Illinois Labor Bull.

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211 Silicosis—Waiver—Insurer and Insurance—Date of Disablement—Statute Construed.

The commission properly held that the defendant's insurer was not on the risk during the period of the employee's "last injurious exposure" to silica dust so as to impose liability on the carrier. The decedent, a stonecutter, was employed by the defendant from November 4, 1950 to September 29, 1951. The defendant was insured up to July 16, 1951. The decedent worked up to September 29, 1951. He died on November 22, 1951 from silicosis and possible tuberculosis. The court rejected the defendant's contention that the testimony of a doctor fixing the date of disablement also fixes the time of last injurious exposure as July 5, 1951. The court held that the period of last injurious exposure was the last 30 days of the decedent's employment while exposed to silica dust, because the decedent worked for the same employer as much as 30 days in a period of seven months. An employee is capable of further injury so long as there is any sound tissue in the lungs to be scarred by the cutting particles of dust and reduced to a fibroid state. The decedent was capable of further injury from silicosis up to and including September 29, 1951 because he still lived and breathed. The statute created an irrebuttable presumption that the last day of work was the date of disablement and the last 30 days of work was the period of last injurious exposure. Affirmed on the defendant's appeal. Reversed on the carrier's appeal. Fetner v. Rocky Mount Marble & Granite Works. North Carolina Supreme Court. No. 257. November 18, 1959.

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212 Heart Condition—Lung Condition—Emphysema—Exposure to Dust and Fumes—Pre-Existing Condition—Causal Connection.

A chef, who was employed by a supper club for six years, was not entitled to receive compensation since he failed to prove that his emphysema and resulting heart condition was an occupational disease. He claimed that while working in a small kitchen he was exposed to dust, cooking fumes and poor ventilation. In January, 1952, he was hospitalized for a lung condition. In May, 1954, he claimed he learned that his condition was an occupational disease in the nature of emphysema of the lungs caused by exposure in his work, and immediately filed a claim for compensation benefits. The Board found he was disabled on October 30, 1954 as a result of emphysema, with pulmonary fibrosis and bronchitis, an occupational disease. The testifying physician said the employee's pulmonary condition was aggravated by his working conditions but he felt the employee had some emphysema prior to his employment. The mere aggravation of a disease not occupational in character is insufficient to establish an occupational disease. Definite proof is necessary to show the disease was contracted in the employment. Reversed. Smith v. Sports Room Supper Club. New York Supreme Court, Appellate Division, Third Judicial Department. No. 949. December 30, 1958.

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BOOKS, PAMPHLETS AND NOTICES

- 213 The Chemical Analysis of Air Pollutants. M. B. Jacobs. Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N. Y. 430 pp. (1960). \$13.50.

Air pollution is an ever-growing menace in our stage of civilization. A fundamental function in the control of air pollution is the determination of the kind and amount of air contaminants. This book details methods to do this. The methods are arranged systematically: first, general methods for sampling as well as the procedures for the determination of air and gas volume, quantity, and velocity; second, analysis of the settled particulate matter on the one hand and the suspended particulate matter on the other; third, methods for the analysis of the gaseous and vapor contaminants of the atmosphere, including radiochemical methods.

Chapters are devoted to stack sampling and the determination of dust loading, to the determination of incinerator flue gases, to the estimation of motor vehicle exhaust gases, and to the determination of odor. Many simple and inexpensive methods of analysis have been included in this book. It is the hope of the author that this text will make a contribution to the analytical chemistry of air pollution control. It should prove useful in industrial control, in commercial control, and in control at every governmental level—Federal, State, County, City, Town and Village. It can readily be adapted for a course in colleges and universities and for the training of air pollution control officials, chemists, engineers, inspectors, and health and sanitary officers. The methods detailed in this work should prove of value to those working in the field of industrial hygiene also: to chemists, industrial hygienists, toxicologists, and physicians. The methods detailed for odor analysis have a wider scope than air pollution control alone.

-- JM

- 214 Occupational Health Bulletin. Volume 5, No. 5 Acrolein. Anon. New Jersey State Dept. of Health, Bureau of Adult and Occupational Health. State of New Jersey Dept. of Health, Trenton 25, N.J. 4 pp. No price given.

Acrolein is an unsaturated aldehyde whose vapors intensely irritate man. Because of these lacrimatory properties it was used as a chemical warfare agent in World War I; however, due to its instability its usage was not successful. It also has been employed as a warning agent in refrigerants using methyl chloride. The principal hazard attributable to acrolein in industry is its toxic effect on man's eyes, mucous membranes and respiratory tract and the irritating effect it has on skin. Workers in the manufacture or use of acrolein should be made cognizant of the nature of the toxicity and the physiological effect on the body. They should be impressed with the necessity for the extreme precautions that are taken in preventing skin absorption and inhalation. Their personal habits of body cleanliness and their conduct off the job (sobriety, sufficient sleep) are factors which should be emphasized. Voluntary visits to the medical department should be encouraged whenever suspected effects appear from a possible exposure.

-- JM

- 215 ASTM Standards on Methods of Atmospheric Sampling and Analysis D22. Anon. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. 116 pp. \$2.25. ASTM members \$1.80.

In recent years there has developed a tremendous interest in the air around us. The expression "free as air" has often led many to believe that air was to be taken for granted. Contamination of air resources has led engineers, scientists and other technologists to re-evaluate "free air" not only from the industrial point of view but also from the health and safety standpoint. In recognition of the need for standardized sampling procedures, analytical methods, definitions, etc., ASTM organized its Committee D22 on Atmospheric Sampling and Analysis. As a result of the committee's work the first complete compilation of the standards on Atmospheric Sampling and Analysis is now available. There are 12 standards including two recommended practices, nine methods of test and one on definitions.

-- JM

- 216 The Properties of Boron. D. N. Williams. DMIC Memorandum 41 (OTS PB 161191). Defense Metals Information Center, Battelle Memorial Institute, Columbus 1, Ohio. 8 pp. (Jan. 4, 1960). No price given.

The element boron has properties that have given rise to speculation on its possible use as a structural material. However, considerable careful work in reduction and purification of boron has produced nothing encouraging. The purest material available today shatters at low impact, has no ductility, and such poor thermal-shock resistance that it breaks up on cooling slowly from the temperature at which it was produced to room temperature. In spite of this discouraging picture, interest in boron keeps reviving and each new generation of workers attacks the boron problems anew. This memorandum was written to collect as much authentic information as is available and to disseminate this to researchers who may be interested in the future potential and present limitations of boron.

-- JM

INDUSTRIAL MEDICAL PRACTICE

- 217 Multiphase Screening of the Well Patient. Twelve-Year Experience of the Tulane University Cancer Detection Clinic. J. E. Schenthal. J. Am. Med. Assn. 172, 1-4 (Jan. 2, 1960).

A study was made of the health status of persons who considered themselves free from disease. Multiphasic examinations carried out in 10,709 apparently healthy subjects showed that 92% had either organic or functional disease. Malignancy was detected in 77 (0.72%), and all those questioned about it stated they had been unaware of it. Cardiopathy was found in 804 examinees, the most frequent form (26.5%) being myocardial disease. The data indicated the importance of systematic health examinations and suggested ways of establishing a base line of what to expect in various age groups. -- Editor's summary

- 218 Rehabilitation Program in Ontario for Occupational Injuries. E. C. Steele. J. Am. Med. Assn. 172, 163-167 (Jan. 9, 1960).

The Ontario plan of compensation, based on a clinical rather than on an adversary approach, is, in effect, a large-scale rehabilitation effort. The individual physician plays a vital role in a team effort to return injured employees to the job quickly, with minimal disability. The concept of rehabilitation includes skillful medical attention at the outset, along with all the skills, modalities, and techniques available to restore the patients to their pre-accident state. From the experience of the author over the years he is convinced that this approach is more humane to the injured workman and less costly to the employer. Those groups of the community most vitally interested—organized labor, employers, and the medical profession—have endorsed the Ontario rehabilitation-compensation system.

- 219 Periodic Health Examination. Nature and Distribution of Newly Discovered Disease in Executives. K. A. Elsom, et al. J. Am. Med. Assn. 172, 5-10 (Jan. 2, 1960).

Records of medical examinations of 1,513 persons in executive positions were studied to estimate the value of periodic health examinations and to determine which phases of such examinations would be most productive of the desired results. At the first examination 612 persons (40%) were found to have previously unrecognized disease, 473 (31%) were free from new disease but had previously recognized impairments of health, and 428 (28%) were classified as healthy. Re-examinations were carried out in 822 persons after an average lapse of 16 months and yielded 386 new diagnoses. In about half of the cases of newly detected disease, the disease was capable of causing death or major disability, and in about 93% the condition was amenable to therapy. The data demonstrated the value of such examinations to the patient and established the relative frequency of the diseases to be watched for.

-- Editor's summary

- 220 Medical Program of Welfare and Retirement Fund of the United Mine Workers of America. W. F. Draper. J. Am. Med. Assn. 172, 33-36 (Jan. 2, 1960).

Adequate medical care for miners and their families was virtually unobtainable before the establishment of the welfare and retirement fund described in this article. Many administrative problems had to be solved, but relations with most physicians in the mining areas of the 26 states in which the program now operates are cordial and satisfactory. Formerly, most patients had to be content with the physician employed by the company or with other physicians whom they could afford to pay within a distance they could afford to travel. Now they can be transported to distant medical centers when necessary, and the beneficiary has a wide choice from the many physicians whom the fund pays for services. The fund has made the most phenomenal strides ever seen in improving the medical services available to its beneficiaries. -- Editor's summary

- 221 Direct Artificial Respiration: Present-Day Teaching and Group Training Requirements. M. H. Brook and J. Brook. *Can. Med. Assn. J.* 82, 245-248 (Jan. 30, 1960).

A safe and practical method of demonstration and group training in direct artificial respiration is described. This project was undertaken in order to facilitate the adoption of the direct method of artificial respiration by first aid and civil defense authorities. An extensive program of education is required to place this knowledge in the public domain. This, along with the advances to be made in the field of prevention, will go a long way towards saving some of the many lives that otherwise would be lost as a result of accidents.

-- Authors' summary

- 222 Diagnosis of Bronchogenic Carcinoma: An Evaluation of Pulmonary Cytology, Bronchoscopy and Scalene Lymph Node Biopsy. W. O. Umiker. *Diseases of Chest* 37, 82-90 (Jan. 1960).

A positive cytologic examination was the only microscopic evidence of carcinoma in over 40% of the resected neoplasms of the bronchus and more cancers were detected by this method than by bronchoscopy and scalene lymph node biopsy combined, unless bronchoscopy included the cytologic examination of bronchial secretions. Positive or suspicious smears were obtained from 44 of 94 bronchogenic carcinomas by a single cytologic examination of sputum. The percentage of positive smears increased to 71% when three specimens were examined and to 96% when more than five were studied. Cytologic examination of sputum was of greatest practical value in the diagnosis of cancers in upper lobes or in the periphery of lungs where bronchoscopy usually fails. The cytologic examination of bronchial washings almost doubled the number of cancers of upper lobes detected by bronchoscopy. Peripheral carcinomas were much more frequently detected by sputum examination than by bronchial washings. Anterior scalene lymph node biopsy was positive in only 22 of 78 patients and was of most value in the diagnosis of undifferentiated-cell carcinomas or adenocarcinomas of upper lobes. Only four squamous cell carcinomas yielded positive biopsy regardless of location and despite the fact that this was the most common tumor.

-- Author's conclusions

- 223 Unsuspected Bronchogenic Carcinoma. J. W. Pate, R. E. Campbell and F. A. Hughes. *Diseases of Chest* 37, 56-60 (Jan. 1960).

This is a report of 32 cases of bronchogenic carcinoma in which the correct diagnosis was never seriously considered before death. These errors occurred in 650 cases of bronchogenic carcinoma from among about 150,000 admissions. The presenting complaints were extremely variable. Joint pain, neurological and gastrointestinal symptoms were present in most cases. Respiratory symptoms were the presenting complaints in only two. Physical findings revealed neurological deficits in 13 and eight had abnormality on examination of the chest. Negative chest x-ray films were obtained from six. Soft infiltrations suggestive of tuberculosis or pneumonia were present in 13; five of these shadows disappeared during hospitalization. Bullous emphysema was the next most common finding on x-ray film. Half of the patients were considered to have tuberculosis and about a third had positive sputa. Metastases were usually extensive, involving the liver, adrenal, bone, brain, heart, spleen, gastrointestinal tract, kidney, thyroid and skin. Study of these errors in diagnosis indicates that spinal or brain compression, joint pain and pulmonary tuberculosis should make one cognizant of the possibility of co-existing bronchogenic carcinoma and that careful, repeated examinations should be made in patients with these conditions to prove or disprove the presence of cancer.

-- Authors' summary

- 224 Bronchogenic Carcinoma. A. Ochsner, et al. *Diseases of Chest* 37, 1-12 (Jan. 1960).

Cancer of the lung is increasing more than any other cancer in both sexes and has become the most frequent cancer. Because the increased incidence is due to the almost universal use of cigarettes, it is necessary to consider its development in all heavy smokers. The diagnosis is difficult to make early. Treatment consists of pulmonary excision, preferably pneumonectomy. Results are not good. In the series of the authors, resection was possible in only 40% and there was no evidence of extension beyond the lung in only 10%. Several

factors, sex, extension of the lesion and the type of lesion, influence prognosis. Because of the tremendous increase in lung cancer and the causal relationship to cigarette smoking, all smokers should have a chest x-ray film made every six months in order to diagnose symptomless pulmonary lesions before metastases occur.

-- Authors' summary

- 225 Survival of Patients with Injuries of the Spinal Cord. Mary H. Burke, et al.
J. Am. Med. Assn. 172, 121-124 (Jan. 9, 1960).

In order to compare the longevity of paraplegic or quadriplegic patients with the longevity of the general population, special statistical procedures have been developed. Data from a series of 5,575 patients grouped according to age permitted comparison with corresponding age-groups from the general population. During the first year after the trauma to the spinal cord the patients showed a mortality 5 to 10 times as high as that among patients who survived the first year. Thereafter the life expectancy increased markedly. Of a group of paraplegic or quadriplegic patients who were under 35 years of age at time of injury and who had survived the first year after injury, 80% were likely to be alive 10 years after injury. The disparity of life expectancy between injured and normal people increased markedly in the older age-groups.

-- Editor's summary

- 226 Tetanus Experience in Connecticut, 1950-1959. Mila E. Rindge.
Conn. Health Bull. 74, 35-40 (Feb. 1960).

The incidence of tetanus in Connecticut is decreasing. Concomitantly with the decrease in the number of cases reported, there has been a decrease in the percentage of cases terminating fatally. A comparison of the cases of tetanus reported in the two 10-year periods shows that there has been a shift toward the older age groups. There has been no change in the sex distribution of cases, the disease remaining primarily a disease of males. Geographically there has been a slight change away from the rural areas. Case fatality rates are high in the older age groups. Analysis of the 1950-1959 cases reveals that in some cases there is no known injury preceding the disease, and in many cases the injury is so slight that no physician is seen. The use of tetanus antitoxin, therefore, can not be depended upon to eliminate the disease entirely. Tetanus has followed injuries on farms and in home gardens, on country highways and on city streets, in manufacturing plants and in the home workshop, on the playground, in the swimming pool, and on hunting fields—any place where people work or play. All people, children and adults, who are exposed to the possibility of injury with contamination should be actively immunized with tetanus toxoid and should receive booster doses at regular intervals as well as at the time of injury. Physicians are urged to check the immunization status of their patients, and patients are urged to check their status with their physicians.

-- Author's summary

SKIN DISEASES AND BURNS

- 227 Toxemia of Burns. Anon. (Editorial). Lancet 1, 153-155 (Jan. 16, 1960).

Extensive burning is followed by serious illness and, despite advances in therapy, many patients still die. The general effects are so profound that it is not surprising that an embracing concept of toxemia or autointoxication was put forward many years ago. The idea is said to have originated in 1876 in Petrograd, where Avdakoff reported that the blood of burned animals was toxic to others. Toxic products released from the burned skin or the blood are alleged to produce illness and even death; but the number and variety of the toxins isolated from time to time (toxalbumin, ptomaines, formic acid, ammonia, proteoses, peptones, histamine, methyl guanidine, hydrocyanic acid, and many others) indicates either their multiplicity or their elusiveness. At one time the concept led to the treatment of burns

by tanning, which, by precipitating the proteins in the altered skin, was said to prevent the absorption of their "toxic" products; but the tannic acid treatment itself produced toxic effects, and tanning—or at least tannic acid—is now discredited. The concept of autointoxication held the field for over 50 years; but during the last 20 to 30 of these years it lost much ground, mainly because advances in physiological and pathological knowledge of burns have rendered the theory less and less necessary and have led to the introduction of life-saving therapy—especially plasma transfusion, antibiotics, and skin excision and grafting. Nevertheless, there is still no complete explanation of many effects of burning, such as the early hyperemia of the lungs, stomach, bowel, kidneys, and other organs, early hyperpyrexia, and polypnea; and many patients still die despite energetic medical and surgical therapy. Although nearly all very extensively burned patients can be kept alive for a week or longer by modern fluid therapy, some die later—generally from pneumonia, other bacterial infection, or other causes which are sometimes obscure.

- 228 Percutaneous Absorption of Toxic Substances in Industry. F. D. Malkinson.
A.M.A. Arch. Ind. Health 21, 87-99 (Feb. 1960).

The physiological principles governing percutaneous absorption through normal and abnormal skin sites are reviewed. Numerous examples of industrial poisoning after penetration of toxic compounds through the skin have been presented. It is emphasized that cutaneous absorption is an important feature of any consideration of industrial hazards. It is, perhaps, second only to the lungs as a route of entry for toxic products. In broad terms, routine study of such compounds as relates to potential cutaneous absorption demands a thorough knowledge of several factors: the physiology of cutaneous absorption through normal and abnormal skin; the lipid and water solubilities of the given compound, as well as its tendency to vaporization if not in the gaseous state; the ability of the compound to produce inflammatory changes in the skin which might increase skin permeability; the rate and extent of absorption of the compound and the nature of its toxic effects in various vehicles after penetration of normal and abnormal skin sites in laboratory animals; the conditions to be encountered in contact with the substance which might enhance absorption—factors such as skin moisture, trauma, and use of strong solvents; the importance of added absorption via other routes of entry, and the effective means of preventing significant absorption through any of these pathways. There are 123 references in the bibliography. -- Author's summary

CHEMICAL HAZARDS

- 229 Thermal Stability and Titrimetric Determination of Decaborane. Mae I. Fauth and C. F. McNerney. Anal. Chem. 32, 91-93 (Jan. 1960).

A method for the quantitative determination of decaborane consists of oxidation with potassium iodate, reaction of excess iodate with potassium iodide, and titration of the liberated iodine with sodium thiosulfate. Acetic acid was found to be the most satisfactory solvent for the decaborane. Recoveries on the order of 98% have been obtained. Differential thermal analysis curves are presented for decaborane heated in air and in helium for the temperature range 20° to 150°C.

-- Authors' summary

- 230 Susceptibility to Respiratory Infections of Animals Exposed to Ozone. 1. Susceptibility to Klebsiella Pneumoniae. S. Miller and R. Ehrlich.
J. Infectious Diseases 103, 145-149 (Sept.-Oct. 1958).

Groups of Swiss white mice and golden hamsters were exposed to the following conditions: (1) different concentrations of ozone followed by aerosol infection with Klebsiella pneumoniae type A; (2) aerosol infection alone; and (3) ozone concentrations alone. There

was also a control group of unexposed animals. In the ensuing 14 days the mortality rate and survival time of the groups were recorded. Exposure to ozone reduced the resistance of mice and hamsters to subsequent respiratory infection with *K. pneumoniae* as these animals showed higher mortality rates, shorter survival times, and a lower LD50 than the controls. The differences in the mortality rates and survival times were statistically significant. Post-mortem examination of the surviving animals killed after 14 days showed that animals infected with *K. pneumoniae* had serous fluid in the pleural cavity and some edema and hemorrhage of the lungs; animals with ozone exposure and infection with the bacterium had viscous purulent discharge surrounding the lungs, more edema, and much more lung hemorrhage. Control animals and those exposed to ozone only showed no gross pathological changes.

-- Bull. Hyg.

- 231 Nitrogen Tetroxide (N_2O_4)—Astronautics Data Sheet—Propellants. S. Sarner. Astronautics 4, 14 (Dec. 1959).

Nitrogen tetroxide is a colorless gas which exists in equilibrium with the red-brown gas nitrogen dioxide. At high temperatures the nitrogen dioxide predominates, but at room temperature and below the dimerized form is predominant. Nitrogen tetroxide reacts with water to form nitric and nitrous acids. These acids react with the alkali salts in the tissues of the respiratory tract forming nitrates and nitrites. This causes intense irritation of the respiratory tract. High concentration of this gas can produce bronchial irritation at first, followed by dizziness, headaches, difficulty in breathing and eventually death. This material has an insidious action, since it can attack without the patient being aware of it. Therefore, it is necessary that anyone who has inhaled a considerable amount of the gas be removed at once to a hospital for treatment. Personnel exposed to this material should use protective equipment. Recommended are chemical safety goggles for protection of the eyes and a respirator to avoid inhalation. Protective clothing is recommended to avoid skin contact. Maximum allowable concentration is 25 ppm by volume in air for exposure of not over 8 hours per day.

- 232 Clinical Categories of Industrial Lead Poisoning. G. Dinischiotu, et al. Arch. Gewerbepathol. Gewerbehyg. 17, 127-147 (1959). German.

The authors express the opinion that although much excellent work on the etiology, clinical aspects, prophylaxis and treatment of lead poisoning has been done, the pathophysiological process in relation to the clinical picture has not been sufficiently studied. Accordingly, in this paper there are described observations and investigations, based on an experience of several hundred cases of lead poisoning, which are divided into 3 groups: (1) the main and subsidiary etiological factors in lead poisoning; (2) individual reactions to lead and associated problems; and (3) the development of lead poisoning in special relation to the time factor. In these 3 sections the subject matter is described and discussed in detail and references are given to published work. It is suggested that types of lead poisoning might be classified into certain categories after study of the symptomatology, the changes in the findings of laboratory investigations during the course of the illness and the history of the patient. The proposed categories of lead poisoning which are fully described are: (1) progressive or evolving; (2) non-progressive; (3) asymptomatic; (4) suspected; (5) acute; and (6) progressive with acute manifestations.

-- Bull. Hyg.

- 233 Contribution to the Metabolism of $MnNa_2$ Edathamil. J. Sykora, et al. A.M.A. Arch. Ind. Health 21, 24-27 (Jan. 1960).

The intraperitoneal LD50 of edathamil $MnNa_2$ in white rats was 1,930 mg. per kilogram. The excretion of manganese in the stool and urine in the first 24 hours after the administration of various doses of edathamil $MnNa_2$ was followed. The excretion of manganese in the urine increases with the increasing dose of edathamil $MnNa_2$; the excretion of manganese doses. Manganese is excreted into the bile after the administration of edathamil $MnNa_2$ as well as after $MnCl_2$. It is concluded that there is a partial decomposition of edathamil $MnNa_2$ in the organism.

-- Authors' summary

- 234 Chelating Agents in Treatment of Acute Porphyrria. J. T. Galambos and L. B. Peacock.
Ann. Internal. Med. 50, 1056 (1959).

A patient who had had prolonged exposure to zinc and lead dust and who developed acute intermittent porphyria was treated with calcium disodium ethylenediamine tetraacetate (EDTA) on 3 separate occasions. Each time his clinical course became worse, necessitating discontinuation of chelation therapy. Because chelating agents can precipitate acute intermittent porphyria or make the existing disease worse, the authors caution against their indiscriminate use in acute intermittent porphyria. In the presence of increased body content of lead, a chelating agent such as calcium EDTA may have dramatic results on the clinical course of acute porphyria. Clinical usefulness and mechanism of action of chelating agents in treatment of porphyria require further evaluation.

-- Can. Med. Assn. J. Absts.

- 235 Fatal Nephropathy During Edathamil Therapy in Lead Poisoning. H. G. Brugsch.
A.M.A. Arch. Ind. Health 20, 285-292 (Oct. 1959).

In an attempt to analyze available reports in regard to possible toxic effects of edathamil calcium-disodium (calcium disodium versenate) given to patients with lead poisoning, 4 cases of fatal toxic nephrosis were collected from the Swiss literature. The first patient, a 38-year-old smelter with an acute exacerbation of chronic lead poisoning, had been given excessively high doses of the drug (600 mg. per kilogram of body weight) intravenously daily for 5 days. The second patient, a 60-year-old worker with white lead, had recurrent attacks of lead poisoning and was given 3 courses of edathamil therapy, the first with a total dose of 10 g., the second with a total dose of 63 g. given within 30 days, and the third with a total dose of 17.5 g. The third patient, a 53-year-old painter with recurrent acute attacks of plumbism, was given 2 g. of the drug by intravenous infusion for 4 days (total dose, 8 g.), and the fourth patient, a 52-year-old man with a history of lead intoxication, received 2 g. by intravenous infusion for 6 days. All patients died, and autopsies were performed on three. Severe tubular necrosis in the area of the proximal tubules and Henle's loops, accompanied by a marked degree of cellular vacuolation and deposit of eosinophilic-staining amorphous material were observed in 2 patients, while hyaline casts within the tubuli were observed in the third patient. Edathamil calcium disodium is still a good drug to be used when needed, but as in so many recently introduced drugs, the time may not be too distant when a safer chelating agent will be substituted. Edathamil should be given only with proper evaluation of the patient's renal status before, during, and after therapy. Courses of therapy by slow intravenous infusion should be short (probably not more than 3 days), widely spaced (more than 2 weeks apart), and with a daily total dose not to exceed 2 g. in adults.

-- Cond. from J. Am. Med. Assn. Absts.

- 236 Fluorescence of the Erythrocytes in Lead Poisoning in Children: An Aid to Rapid Diagnosis. J. A. Whitaker and T. J. Vietti. Pediatrics 24, 734-745 (Nov. 1959, Pt. 1).

Red fluorescence of erythrocytes occurs during lead poisoning. The authors examined microscopically with the aid of blue ultraviolet light a thin wet-preparation of erythrocytes obtained from 7 untreated children, between the ages of 15 and 36 months, with lead poisoning. In every one of these children the red fluorescence was observed in 75 to 100% of the erythrocytes. The exact nature of the fluorescent material in the erythrocytes has not been determined; it is probable that the fluorescence is related to the amount of free protoporphyrin in the erythrocytes. One hundred fifty control specimens, obtained from normal children and others with various clinical conditions, also were examined microscopically and showed 0 to 50% fluorescent erythrocytes. This test is a simple, rapid, reliable method to aid in the diagnosis of lead poisoning in children.

-- J. Am. Med. Assn. Absts.

- 237 Nitroglycol Poisoning. I. Maccherini and E. Camarri.
Med. lavoro 50, 193-201 (Mar. 1959). Italian.

The authors describe occupational disease in persons working with antifreeze dynamite which in addition to nitroglycerin contains dinitroglycol and nitroglycol for their properties

of lowering the freezing point of nitroglycerin. Knowledge of the action of nitroglycerol in man is slight. Because of its high volatility absorption is mostly by inhalation, though it can also be absorbed through the skin. Symptoms start when work is begun and consist essentially in vasomotor phenomena which usually disappear within 2 to 3 weeks, but the most typical manifestations are stated to be anginoid crises occurring about 48 to 60 hours after finishing work. In a discussion of the mechanism of action the possibility is put forward of the anginoid crises arising through deficient oxygen consumption by the myocardium due to the inhaled nitro compounds causing dilation of the coronary arteries and an increased blood flow. After work ends there is an increased oxygen consumption by the myocardium not compensated for by increased coronary flow. However, the authors conclude that as present day preventive methods have reduced the level of the volatile components below the toxicity level of 2 mg./cu.m., if care is taken to exclude from such work persons with hypotension, anemia, or hyperthyroidism, little difficulty should arise.

-- Cond. from Bull. Hyg.

- 238 Freon as a Cause of Poisoning. T. Dalhamn.
Nord. Hyg. Tidskr. 39, 165-169 (1958). Norwegian.

Various types of Freon (chlorinated fluorinated hydrocarbons) are frequently used as ejecting gases in aerosol packs, and although they are not toxic they may nevertheless give rise to phosgene, hydrofluoric acid, hydrochloric acid, sulfur dioxide and chlorine in contact with hot surfaces in concentrations much higher than the maximum permissible levels. The possible occurrence of intoxication by Freon decomposition products was investigated by the author in a study of the records of gas poisoning from all the hospitals in Sweden between 1950 and 1954. Forty-three cases occurred in all; 2 of these were due to phosgene poisoning, and brief histories are given. (1) A mechanic aged 52 operated with an acetylene torch on a refrigerator which was discharging dichlorodifluormethane (Freon-12) from a leak; he developed dyspnea, malaise and vomiting, and required hospital treatment for 5 days. (2) An agricultural worker aged 47 sprayed his bedroom with an aerosol fly spray containing Freon, switched on an electric heater and then went to bed. He awoke in the night with malaise, vomiting, and diarrhea and died on the following day, 3 hours after admission to a hospital.

-- Bull. Hyg.

- 239 Effects of DDVP Aerosols on Blood Cholinesterase of Fogging Machine Operators. R. F. Witter.
A.M. A. Arch. Ind. Health 21, 7-9 (Jan. 1960).

The levels of blood cholinesterases were studied in men who used Todd Insecticidal Fogging Machines to apply 4% O, O-dimethyl-2,2-dichlorovinyl phosphate (DDVP) aerosols for 16 hours a week to tobacco warehouses. No decrease in the concentration of the plasma or red blood cell enzyme was found over a period of 4 months. It is concluded that this method of application of DDVP does not constitute a hazard to the health of these workers, providing the fogging machines are properly used.

-- Author's summary

INDUSTRIAL DUSTS

- 240 Respiratory Distress Induced by Gum Arabic. H. Desoille, A. Hadengue and R. Feletin.
Arch. maladies profess. 20, 282-283 (May-June 1959). French.

This is an account of a printing worker, aged 42, who developed asthmatic attacks, severe enough to need a bronchorelaxant, each afternoon while working, but not when away from work. He had worked in the same place since 1929 and his symptoms began after gum spraying was introduced 2 to 3 years ago. There was no past or family history of asthma. There were some adventitious sounds in the lung, but otherwise clinical examination and blood counts were normal. X-ray examination of the chest showed normal translucency with slightly accentuated hilar shadows. Patch tests with gum arabic solution and workroom dust

were negative. Respiratory function was measured before and after inhaling an aerosol of gum arabic in water and alcohol for 2 minutes. Though the subject experienced no dyspnea during the experimental conditions, there was an unquestionable decrease of vital capacity which persisted and was subsequently accentuated after inhaling an aerosol of aminophylline. The experimental conditions did not approach in severity the atmospheric conditions of the workroom where towards the end of the day the atmosphere was genuinely misty from the spray which on drying gave rise to much dust.

-- Bull. Hyg.

- 241 A Case of Aluminum Dust Lung. A Necropsy Report. M. Ueda, et al.
Kobe J. Med. Sci. 4, 91-99 (June 1958).

This is a full case report of a man aged 32 years who died 3 years after giving up work in which he had been exposed to the inhalation of metallic aluminum dust for 3 1/2 years. The main necropsy findings were a chronic interstitial pneumonia with severe cavitation in the right upper lobe and numerous small cavities in the rest of both lungs. Microscopically, some black and brownish granules and pigments in phagocytes were present in the interstitial tissue. The presence of excess aluminum in the lungs was confirmed both by spectroscopic and quantitative chemical analysis. There was no excess copper, iron or other minerals in the lungs. Analysis of the air-borne dust in the factory showed it to contain 96% aluminum dust, of which 99.3% was metallic aluminum, and stearic acid 4%, with traces of silicon, iron, and copper. This is claimed to be the first case report of chronic lung disease due to aluminum dust in Japan.

-- Bull. Hyg.

- 242 Operating Characteristics of Freon-Powered Samplers under Field Conditions. L. Marcus, F. E. Bartlett, M. E. Smith and I. A. Singer. Proc. 52nd Annual Meeting, APCA, Los Angeles, Calif. 8 pp. (June 21-26, 1959).

A Freon vacuum device which is powered basically by the heat of the atmosphere, has been made available. It consists of a small orifice and venturi system utilizing Freon gas, provided by an attached container, to produce a vacuum suitable for small volume applications. The rate of gas release depends in most applications on the air temperature, the container design and the air circulation in its vicinity, as well as the size of the jet orifice. The Brookhaven Meteorology Group, having a continuing need for air-borne and other remote sampling devices, has tested the equipment to determine its suitability as a field sampling unit. The results of these tests have shown that the Freon sampler has operating characteristics which are quite different from those normally found in electrically-powered devices, and it is felt that review of these data may be valuable to other investigators. -- APCA Absts.

- 243 Determination of Particle Size by Beta-Back-Scattering. P. Connor, W. H. Hardwick and B. J. Laundry. J. Appl. Chem. (London) 9, 525-531 (Oct. 1959).

A cumulative method of particle size analysis is described wherein the mass deposited from an homogeneous suspension by gravitational or centrifugal force is determined by a beta-back-scatter thickness measuring technique. The method is applicable to compounds having an effective atomic number greater than 16, and comparisons of results obtained by this and other methods for thorium, uranium, zirconia, and lithopone powders are given.

-- APCA Absts.

- 244 Measurement of Droplets in Clouds by Direct Photography of Liquid Drops Suspended in Air. A. Arnulf, J. Bricard, R. Burtin and C. Veret. Ann. Occ. Hyg. 1, 162-179 (Apr. 1959). French.

In an introductory section methods of sizing clouds of droplets are outlined, the difficulties of direct photography of drops in air are pointed out and an apparatus specially designed for the study of drops composed of volatile liquids is described. In this apparatus the drops are photographed as they are swept by a jet of air through the field of view of a microscope, the illumination being at right angles to both air movement and the axis of the

microscope. In the second part the appearance under the microscope of a water droplet illuminated laterally is interpreted: three parts of the image appear bright, one corresponding to light externally reflected by the drop, one to light directly transmitted and one to light transmitted after two internal reflections. The brightness of these three images is calculated on the basis of Wiener's theoretical results. Finally, the appearance of the images obtained with the proposed apparatus is explained, and its performance compared with those of normal methods.

-- Bull. Hyg.

- 245 Current Concepts of Pneumoconiosis. Pathological Aspects. P. Gross.
J. Am. Med. Assn. 172, 546-549 (Feb. 6, 1960).
Reprints available from the Industrial Hygiene Foundation upon request.

The clearance of dust particles from the pulmonary alveoli toward the bronchi depends to some extent on adequate respiratory excursions of alveolar walls. Dust particles not so removed can penetrate the alveolar membrane instead; it is now believed that naked dust particles can pass directly through the alveolar membrane and are not carried by macrophages. In silicosis the silica-bearing cells in the characteristic nodules are thought to be proliferated alveolar cells that have remained in situ instead of desquamating. In explaining the subsequent fibrosis it is now postulated that silica crystals possess surface activity which denatures proteins and that the deposition of beta and gamma globulins in the nodules is indicative of a subsequent immune reaction. Tuberculosilicosis must be considered as a special case of a general disease process for which the more inclusive term "tuberculo-pneumoconiosis" is proposed.

- 246 An Experimental Study in Hematologic and Endocrine Changes in Animals kept in Coal Pits.
N. Loni, et al. Igiena (Bucharest) 8, 11-20 (Jan.-Mar. 1959).

Guinea pigs kept for 4 months in the galleries of coal pits displayed anthracotic and pneumoconiotic lesions in the lungs as well as marked anemia. The endocrine changes differed according to environmental temperature and consisted in adrenal and thyroid stimulation in cold galleries and in thyroid inactivation and testicular lesions in the hot galleries. The regeneration of red blood cells was insignificant in hot galleries and very marked in cold galleries. To a certain extent these differences might be related to the functional state of the endocrine glands, and particularly of the thyroid. The percentage decrease of eosinophils, which was more intense in the cold gallery, may be interpreted as a hematologic response to adrenocortical stimulation. A classification is outlined of the various ways in which the endocrine system is influenced by labor conditions and harmful occupational agents.

-- Bull. Hyg.

- 247 Dust Disease of Miners. M. Carstens, et al.
Arch. Gewerbepathol. Gewerbehyg. 17, 67-107 (1959). German.

This long paper presents the clinical and physiological findings in a group of 623 compensated miners. Of this group 404 had silicosis (146 stages I and II and 258 stage III) and 219 were free from silicosis but had bronchitis and emphysema, heart and circulatory disorders and other miscellaneous conditions. The authors conclude that miners' lung function declines earlier and more rapidly than that of other workers and that this decline is not closely related to a diagnosis of silicosis or bronchitis and emphysema but depends on the length of time worked in the industry; simple silicosis causes no reduction in lung function, while massive fibrosis reduces function in proportion to the size of the mass; and that bronchitis and emphysema are independent of the presence or stage of silicosis. These conclusions are discussed in the light of a system of compensation based on radiographic evidence of silicosis and the authors express the view that miners' dust disease is the sum of all reactions of the organism to dust, including physical and chemical irritation of the bronchi and alveoli leading to bronchospasm, asthmatic bronchitis, emphysema and bronchiectasis.

-- Bull. Hyg.

03120520

- 248 Animal Experiments with Quartz-Containing Ash Obtained from the Lungs of Acute and Chronic Silicotic Subjects. R. Kern.
Arch. Gewerbepathol. Gewerbehyg. 17, 108-116 (1959). German.

The object of the experiments was to use the actual quartz-containing dust extracted from lungs affected by acute and by chronic silicosis to test whether acute silicosis is due to the inhalation of a large amount of quartz for a short time or to the inhalation of freshly fractured quartz. One group of rats was given the ashed dust from an acute silicotic lung and another group the dust from a chronic silicotic lung. Some rats received the dust by intraperitoneal injection and some by intratracheal injection. A control group of rats received ashed dust freed from quartz. Equal doses of each dust were injected into the separate groups and animals from each group were sacrificed at the same time intervals after injection. The amount of fibrosis produced by each dust was proportional to its quartz content and to the period after injection. The amount of fibrosis produced by each dust was proportional to its quartz content and to the period after injection. No differences were observed between the ashed dusts obtained from the acute and chronic silicotic lungs. The quartz-free dust produced no fibrosis. The results provide further evidence against the hypothesis of an enhanced fibrogenic property of freshly fractured quartz as compared with aged quartz. Quartz particles under 3 microns in size were found to be the more fibrogenic, which is in accord with results of other workers.

-- Bull. Hyg.

- 249 Experimental Silicosis: The Inhibitory Effect of Iron. P. Gross, Marian L. Westrick and J. M. McNerney. Diseases of Chest 37, 35-41 (Jan. 1960).
Reprints available from the Industrial Hygiene Foundation upon request.

The inhibition of the fibrogenic action of quartz dust by associated iron, initially reported by Kettle and later confirmed by Gardner and Vorwald has been reconfirmed. In rats, this inhibition was temporary, serving to delay the maturation of silicotic nodules by a few months only. In guinea pigs, iron completely prevented the formation of silicotic nodules but it did not inhibit completely the development of collagen within thickened alveolar walls. In rats, the development of collagen within silicotic nodules paralleled the disappearance of iron from these sites. In guinea pigs, the iron had also disappeared from those regions in which collagen had developed. Yet, there were other foci in which there was manifest inhibition of collagen formation in spite of the fact that abundant iron-free silica was demonstrable in such regions. This apparent inhibition of fibrosis in the absence of iron contradicts Gardner's premise (applied to aluminum) that the inhibiting substance, to be effective, must occupy the same cell as the quartz particle which it inhibits.

-- Authors' summary

- 250 Morbidity and Pathology of Lung Cancer with Asbestosis. H. Bohlig, G. Jacob and B. Kallabis. Z. Unfallmed. Berufskrankh. 52, 64-78 (Mar. 15, 1959). German.

The extensive world literature on cancer of the lung in asbestos workers and on related subjects is here reviewed at considerable length with statistical analysis and critical discussion. From these reports the admittedly rough estimate is made that among 40,000 asbestos workers in the world 80 cases of lung cancer have been reported in 20 years. The opinions and conclusions of different observers vary considerably and these differences are examined. Particular consideration is given to the importance of skilled autopsy examination and the difficulties which may exist in forming an opinion on whether in a particular case exposure to asbestos contributed to the development of cancer. Much more research on this cancer problem is needed but up to the present it is stated that a comparison of the expectation of pulmonary cancer in the general population with that of workers in asbestos shows that in the latter groups the risk of cancer is not increased. The morbidity curve of cancer with asbestosis perhaps reaches its peak at a somewhat earlier age than that of non-industrial bronchial carcinoma.

-- Bull. Hyg.

03120521

- 251 Are Silicosis and Asbestosis Predisposing Causes of Cancer of the Lung. N. Nordvik. Arch. belges med. sociale 17, 85-99 (Feb. 1959). French.

A grinder of steel castings who suffered from silicosis developed cancer of the lung which was proved by the detection of malignant cells in the sputum. He claimed compensation on the basis that the combined lesions constituted an occupational disease. This question whether or not malignant disease of the lung should be regarded as causally related to pneumoconiosis and so compensatable is not uncommon nowadays; indeed it is an increasingly frequent problem for compensation medical boards. The crucial difficulty is that primary cancer of the lung is a disease prevalent among all groups of the population, irrespective of their occupations. A particular aspect of the problem is the excessively high incidence of lung cancer among heavy cigarette smokers. In the absence of experimental proof that pneumoconiosis and cancer of the lung are linked etiologically, recourse must be had to studies of the relative prevalence of lung cancer in separate occupational groups. This statistical approach has been used in many field studies all over the world. A review of these studies is the substance of the present article. The author does not accept that there is any interrelationship between cancer and silicosis but admits the probability in asbestosis. These conclusions accord generally with present thought and practice in Great Britain.

-- Cond. from Bull. Hyg.

- 252 Glass Dust: A Study of Its Biologic Effects. P. Gross, Marian L. Westrick and J. M. McNerney. A.M.A. Arch. Ind. Health 21, 10-23 (Jan. 1960). Reprints available from the Industrial Hygiene Foundation upon request.

A study was made of the biologic effects of glass dust upon the conjunctiva, the gastrointestinal tract, and the lungs of experimental animals. No effect of glass dust and glass flakes was demonstrable upon the conjunctiva. No toxic or traumatic effect was demonstrable upon the gastrointestinal tract. There was only slight depression of the growth rate when rats ingested a diet containing as much ground glass as food. This depression was due entirely to a lower food intake caused by the bulkiness of the glass diet. The pulmonary changes in guinea pigs exposed to fine glass dust for one year and those of rats either exposed to the same dust or given injections intratracheally with it were minimal in character and consisted only of small focal alveolar dust cell collections without fibrosis. In the pulmonary lymph nodes there were also focal intracellular glass-dust deposits which were likewise not associated with reactive fibrosis. There was no bronchial disease attributable to the dust. Compared to kaolin, the pulmonary effect of fine glass dust was even more benign, because the stored dust remained alveolar instead of occupying interstitial positions and therefore was more readily mobilized and cleared from the lung. Coarse glass dust injected into the lungs of rats behaved like inert foreign material and was associated with minimal foreign body reaction without significant collagen formation.

-- Authors' summary

- 253 Infection with Atypical Tubercle Bacilli in Graphite Pneumoconiosis. M. J. Hirsch. A.M.A. Arch. Internal Med. 103, 814-817 (May 1959).

Graphite pneumoconiosis is comparatively rare. In the literature of the subject post-mortem findings have been reported in 7 cases but though pulmonary cavitation occurred in 5 of these, in 1 case only was it attributed to tuberculosis. A 52-year-old white man while employed at a graphite mine in Texas, where he had worked for 9 years, developed a spontaneous pneumothorax, which was complicated by pleural effusion. Radiographic examination revealed diffuse pulmonary fibrosis which was diagnosed as graphite pneumoconiosis, and excavating tuberculosis of the right upper lobe. This was treated by lobectomy and the diagnosis of pneumoconiosis was confirmed. The particular interest of the case is in the bacteriological findings. Acid-fast bacilli were cultured from the sputum and directly from the resected pulmonary cavity. The organisms were non-pathogenic for guinea pigs, mice, chickens and rabbits. In the present case the organism is regarded as an atypical non-chromogenic mycobacterium and the pneumoconiosis is considered to be a factor predisposing to progressive infection with organisms which are not ordinarily pathogenic for man. A few similar cases have been reported in association with silicosis.

-- Cond. from Bull. Hyg.

IN RE: ABRAMS November 1959

03120522

PHYSICAL ASPECTS OF THE ENVIRONMENT

- 254 Further Investigations on the Health of Workers Exposed to Heat Radiation. P. Strohmenger and L. Grun. Arch. Hyg. u. Bakteriologie. 143, 161-171 (Apr. 1959). German.

In this paper which follows a previous one on the same subject the authors analyze the sickness experience of workers exposed to high temperatures in respect to the nature, frequency and duration of illness. Data from three groups were considered. These groups were: (1) two hundred thirty-one men directly exposed to high temperatures in a steel plant who worked on an 8-hour changing shift system; (2) one hundred eighty-five men, also on changing shift work, who worked in association with the actual steel production but were not directly exposed to the heat radiation as were group (1); and (3) two hundred forty-seven workers who were not exposed to heat and worked only for the early 8-hour shift from 6:00 a.m. to 2:00 p.m. The results of the investigation are described with several statistical tables and are discussed with reference to other published work. The main finding was that disorders of the stomach and intestinal tract were equally frequent in groups (1) and (2) and that this prevalence was about double that experienced in group (3). No statistically significant differences were found between the three groups in respect to the prevalence of diseases of the liver, gall bladder, kidney, skin, heart and circulation. It was also found that in workers exposed to strong heat radiation there was frequent retirement from work before the age of 65 and also frequent change of employment which are regarded as evidence of premature loss of working capacity.

-- Bull. Hyg.

- 255 Investigations on Heating Radiation in an Ironworks. J. Borneff. Arch. Hyg. u. Bakteriologie. 143, 1-20 (Jan. 1959). German.

The importance of heat radiation in medicine and also in regard to carcinogenesis has been discussed. The climatic conditions and heat radiation were determined at different sites of an ironworks. The maximum intensity of radiation amounting to 0.65 watt/cm² was found at the blooms shears. The average radiation to which the workers were exposed during a working day amounted to 1,500 to 5,000 watts/sec./cm². The energy of the infrared radiation was distributed differently into the short and long wave part of the infrared depending upon the working place examined. The greatest part of the energy of the short wave infrared radiation up to 1,400 millimicrons (this is the radiation which invades the tissue) was emitted by the molten iron during tapping of the blast furnace.

-- Bull. Hyg.

- 256 Heat Radiation Particularly in Glass Works. J. Borneff. Arch. Hyg. u. Bakteriologie. 143, 241-261 (June 1959). German.

The present investigation presents results obtained in the study of two glass works. There is an account of the different processes of glass manufacture in these works which is followed by a description and discussion of the literature on the diseases of glass workers. These diseases are considered in separate sections on: (1) the general diseases among which are those of the respiratory system, the skin and the digestive system and also rheumatism and cardiac disease; (2) the association of heat radiation and cancer. This subject is discussed at length although the author found no evidence of such an association in glass blowers, and (3) the incidence of cataract in workers in glass and other industries. Physical measurements were made at many different points in the two glass works and for comparison in a domestic kitchen. It was determined that glass blowers working near the melting furnace receive a daily dose of radiation of 2,000 to 3,000 watts/sec./cm² of which about 10% is infrared radiation of wave lengths smaller than 1,400 millimicrons. This amount of radiation is actually less than that to which blast furnace workers in ironworks had been shown to be exposed yet the incidence of cataract in these ironworkers is less than in glass blowers. To explain this the opinion is

expressed by the author that cataract is caused not by the direct effect of infrared radiation on the lens, but probably by the continual heating of the tissues of the eye by hot air, for it was shown that air temperature was much higher for the glass workers than for the blast furnace workers.

-- Cond. from Bull. Hyg.

- 257 Freezing Point of Human Skin. W. R. Keatinge and P. Cannon.
Lancet 1, 11-14 (Jan. 2, 1960).

The results of this investigation show that, contrary to general belief, human tissues can freeze at the temperature of freezing sea water and that they can sustain injury as a result of being frozen at this temperature. Human fingers cooled to -1.9°C , the freezing point of sea water, usually froze. They almost invariably did so when they had been soaked in fresh water and ice beforehand. The true freezing point of human fingers was found to be between -0.53 and -0.65°C . Freezing in brine at -1.9°C for 4 to 7 minutes, without trauma in the frozen state, caused no significant injury. However, freezing for 11.5 minutes or repeated freezing for shorter periods caused hyperemia and tenderness lasting for several days, and, in the case of repeated freezing, blistering of the skin. No ill effects were produced by supercooling fingers to the same temperature for the same time. Earlier statements that human tissues cannot freeze in sea water appear to have been based on indirect evidence.

- 258 Noise Data for Two Outboard Motors in Air and in Water. R. W. Young and C. N. Miller.
Noise Control 6, 22-25 (Jan.-Feb. 1960).

This investigation is concerned with noise data for two outboard motors, a Johnson Model AD-12 of 7.5 hp and an Evinrude Model 15020, 18 hp motor. At a speed of about 4 knots both the 7.5 and 18 hp outboard motors made nearly the same noise in air interpolation in a table leads to a typical A-sound level of 52 db at a distance of 100 feet for both motors at this speed. The air-borne noise of the smaller motor for a speed of 3 knots was 3 db less; the noise of the larger motor was 6 db more when the speed was 5 knots. The sound pressure level in the water at audio frequencies was on the average about 25 db greater than in air, but this difference depends upon frequency and hydrophone depth. The 18 hp motor produced relatively more (4 db) water-borne sound in comparison with its air-borne sound than did the 7.5 hp motor. If one may rely upon memory, the outboard motor of today is quieter than its predecessor of 20 years ago. Published evidence appears to be lacking on which to base this comparison, but perhaps the present data will constitute a minor milestone from which future noise reduction can be measured.

- 259 Subjective Noise Meters. F. C. Anderson.
Noise Control 6, 7-10 (Jan.-Feb. 1960).

Human reactions to noise are frequently related to ratings in terms of loudness (sones), loudness level (phons), and speech interference level (decibels). Since no instrument presently exists for measuring these quantities directly, they must be computed from octave-band sound pressure levels. The time required to obtain the data, perform the octave-band analysis, and compute the required quantities is excessive. This is particularly true in the case of noise of short duration where a calibrated tape recorder must be used to store the data for later playback and analysis. Because subjective ratings have become increasingly important, especially to aircraft manufacturers since the advent of jet aircraft, an instrument that will give a direct reading of these subjective levels is highly desirable. A direct-reading instrument of this type would also be very useful in connection with establishing and enforcing community noise ordinances. This article describes meters under development to make direct readings of such subjective ratings of a noise as loudness, loudness level, and speech interference level. The speech interference level meter has been constructed.

03120524

- 260 Acoustical Fatigue Test Procedures. D. M. Forney, Jr.
Noise Control 6, 11-21, 49 (Jan.-Feb. 1960).

This paper has presented what is intended to be at least a broad review of some of the current test practices and an unbiased discussion of the rather substantial variation in technique which characterizes much of the acoustical fatigue work conducted in the United States. It has been shown that, because the general entry into the acoustical fatigue problem area several years ago was quite abrupt, because the needs and objectives of various groups have been different in some cases, and because environment simulation and data analyses pose difficult problems, a significant degree of variation in practice in industry prevails. It is the feeling of the author that if the discussion promotes perhaps a more serious examination of the pros and cons of controversial questions, then indeed, a service has been performed. What may prove to be the greatest future contributions to the state-of-the-art of analysis and experimentation is not only an increase in the relatively meager amount of actual research on acoustical fatigue phenomena by industry, and a subsequent greater exchange of information between groups, but also a stronger effort by design and test groups to combine their ideas and standardize procedure for greater interchangeability of test results and an over-all advancement of the technology.

-- Author's conclusion

- 261 Noise Environments of Flight Vehicles. I. Dyer, P. A. Franken and E. E. Ungar.
Noise Control 6, 31-40, 51 (Jan.-Feb. 1960).

This article presents estimates of the external noise environments of air- and space-craft based on information currently available. Engine noise, oscillating shocks, surface pressure fluctuations, and wake noise appear most significant. Many more measurements are needed.

-- Editor's summary

- 262 Quieting Circular Saws. A. L. Cudworth.
Noise Control 6, 26-30, 52 (Jan.-Feb. 1960).

The following step-by-step procedure should facilitate the solution of circular saw noise problems: (1) Check the mechanical condition of the machine. (2) Determine if the noise is due to siren action or rim resonance. (3) Investigate the use of different type of saw. (4) Use stiffening collars of largest possible size. (5) Apply damping tape to check if resonance noise can be controlled. (6) Use necessary width and thickness of damping rings for permanent damping treatment.

-- Author's summary

- 263 Noise Reduction in High Pressure Fluid Transfer Systems. F. W. Vetter and F. S. Venable.
Noise Control 6, 41-43 (Jan.-Feb. 1960).

Anti-knock compound, tetraethyl lead, is added to gasoline under suction created by pumping the gasoline through eductors in a closed system. Intense noise is generated at the eductor. Satisfactory noise reduction was achieved by reducing the pressure drop across the eductor to an extent that did not adversely affect the rate of addition of the compound.

-- Editor's summary

03120525

RADIOACTIVITY AND X-RADIATION

- 264 A Summary of Fifteen Years of Experience with Dust Problems in the Refining and Fabrication of Uranium. M. G. Mason. HASL-58 (pp. 3-9). Mallinckrodt Chemical Works, St. Charles, Mo. 7 pp.

The 15 years of experience with uranium production shows no clinical or medical evidence of damage to workers from chronic exposure, even though some workers had potential high chronic dust exposure in the early years. Dust control continues to be a major health protection problem. The uranium industry as a whole does not have well-defined standards for health protection and is faced with continued controversy in the matter of protection versus cost. It is imperative that adequate standards be developed so that the industry can proceed in an orderly manner. Whether the data indicate a need for the program to be conservative or liberal is secondary to the need for uniformity and for a clear definition of minimum performance requirements.

-- Nuclear Sci. Absts.

- 265 Uranium in Tissues, A Case History. D. A. Holaday. HASL-58 (p. 215). Occupational Health Field Station, Salt Lake City, Utah. 1 p.

Data are presented on the distribution of uranium in lung tissues obtained at autopsy from a miner who worked in a uranium mine for about 5 years. It is suggested that possibly physical condition has a marked effect on the distribution and metabolism of uranium in the body.

-- Nuclear Sci. Absts.

- 266 Radiation Biology and Cancer. A collection of papers presented at the Twelfth Annual Symposium on Fundamental Cancer Research, 1958, Austin, Texas. University of Texas Press. 498 pp. (1959).

Topics discussed at this symposium include radiation neoplasia and endocrine systems, fundamental radiobiology, radiological applications, radiation effects on the hematopoietic system; the induction of neoplasia by ultraviolet light, the induction of neoplasia by ionizing radiations, radiation biology and cancer, and medical applications of radiation. Complete subject and author indexes are included. Separate abstracts have been prepared of each paper.

-- Nuclear Sci. Absts.

- 267 Hematological Findings in Persons Working in the X-Ray Department. R. D. Ganatra and R. Y. Sawant. Indian J. Med. Sci. 13, 393-400 (May 1959).

This account of an investigation into the blood of people working in x-ray departments is of interest particularly because of the occurrence of lymphocytosis in spite of ordinarily safe working conditions. The results were obtained from 8 hospitals in the Bombay district and the findings refer mainly to those people who worked in the x-ray diagnostic department. The maximum permissible dose per year was 5 gamma and no one received as much as this. The mean lymphocyte count was higher in 34, out of a total of 73 people examined. The author was unable to trace any relationship between this behavior of the lymphocytes and the dose of x-radiation. He favors the view that the nature of the work, equipment and layout in the x-ray departments concerned, which were not in any way condemned, was nevertheless the important factor in establishing this condition of lymphocytosis in such a considerable proportion of the working staff.

-- Cond. from Bull. Hyg.

- 268 Strontium-90 in Food. J. L. Kulp, R. Slakter and A. R. Schulert.
Agr. Food Chem. 7, 466-469 (July 1959).

The average concentrations of strontium-90 in U. S. foods in July 1959, were cereals, 20 s.u.; vegetables, 12 s.u.; and milk 8 s.u. The physical aspects of fallout, and the manner in which debris produced at the detonation of thermonuclear devices is transmitted through the atmosphere to the soil, plants, foodstuffs, and man are reviewed. The influence of the amount of rainfall on fallout levels in the soil is discussed. The effect of the amount of available calcium in the soil on transport of strontium-90 into plants is considered. Other factors affecting levels of strontium-90 in foods are discussed. It is pointed out that hazards represented by current rates of strontium-90 from fallout have not been completely evaluated. No pathological effects have been demonstrated at radiation levels as low as those involved in fallout.

-- Nuclear Sci. Abstrs.

- 269 Expanding the Utilization of Radioisotopes and Nuclear Techniques in Food Toxicology and Processing. J. H. Rust. AECU-4327. Massachusetts Inst. of Tech., Cambridge. 62 pp. (Nov. 1959). Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D.C.

Areas in the field of food technology in which radioisotopes and nuclear techniques may be used to advantage are reviewed. A general estimate is presented of the scientific and physical capabilities of the food industry in the special areas of chemical and biochemical food toxicology and associated food processing problems. Since the industry is faced with a new and enormous task in food toxicology, the role that radioisotopes and nuclear techniques can play is a prime consideration. Recommendations for action and an estimate of the cost of a research program are included. Appended are several pertinent discussions covering the present situation, the potential of tracer methods for food toxicology, possible areas of study, development of a labeled compound program, training and education, an evaluation of the carbon-14 recoil method of labeling organic substances, applications of radioactive tracers in the study of food additives, and a list of government agencies interested in the field of food technology.

-- Nuclear Sci. Abstrs.

- 270 Measurement of Radioactivity in Air Filters. E. J. Story and A. W. Waltner.
Health Physics 2, 49-52 (July 1959).

Measurements of the fallout fission product activity that accumulates in the air filters employed in ventilation systems are described. A general method for determining the gamma-activity of pelletized filter samples using a sodium iodide well-type crystal spectrometer is discussed. The photofraction of a well-type crystal was measured and data are presented for gamma-ray energies from 0.12 to 1.12 Mev. It is suggested that building air filters be employed in monitoring programs connected with laboratories, reactors, and studies on fallout.

-- Nuclear Sci. Abstrs.

- 271 Detection of Radiological Air Pollutants. L. Bourmash. Proc. 52nd Annual Meeting, APCA, Los Angeles, Calif. 5 pp. (June 21-26, 1959).

This report is a brief summary of techniques used in present day installations for the detection of nuclear wastes emitted to the atmosphere. Radiological air pollutants may be considered as a specialized case of air pollution. Many methods and techniques used to evaluate levels of non-radioactive contaminants may be modified for use in the detection of radioactive pollutants. The release of quantities of radioactive materials sufficient to be hazardous may occur in the exhaust systems of nuclear reactors, nuclear chemical processing plants, and nuclear accidents. The plant effluents of most importance are gaseous or particulate in state. The evaluation of environmental radiological pollution requires the collection of samples of air-borne and fallout contamination. The radioactive analyses of these samples indicate the level of pollution present in the environment. It is necessary to evaluate correctly the contamination concentrations in order to determine changes and hazards. While an increase in radioactive material is a measure of pollution, it is not necessarily a hazard.

-- APCA Abstrs.

- 272 Experience of a Plant Operated Laundry. K. R. Heid and E. C. Watson. HASL-58 (pp. 162-167). General Electric Co., Hanford Atomic Products Operation, Richland, Wash. 6 pp.

Decontamination laundry facilities are described for processing clothing potentially contaminated with plutonium, uranium, fission products, or combinations of these. Recognized commercial laundering agents were found to have little value in removing normal radioactive contaminants. Compounded agents containing glassy phosphate salts and carbonate and ammonium ions proved to be more effective. These agents are tabulated, and results of tests are included.

-- Nuclear Sci. Absts.

- 273 Laundry Operations in a Uranium Feed Materials Plant. W. L. Utnage. HASL-58 (pp. 168-171). Mallinckrodt Chemical Works, St. Charles, Mo. 4 pp.

Clothing contaminated with significant amounts of uranium may not be released to public laundries according to recommendations of the NCRP. Release of clothing to commercial laundries would require some pre-washing in most cases and extensive monitoring and separation facilities. Contamination levels would have to be below maximum levels established by the NCRP. When contamination levels are the controlling factor, cost advantage is irrelevant, whether favoring in-plant or outside laundry service. NBS handbook recommendations should be followed. For long-term consideration there is no cost advantage in using outside laundry service; in fact, in Mallinckrodt's operation, there is a definite cost advantage in using an in-plant laundry. Better control of contamination is achieved with an in-plant laundry. No commercial laundries were found that were licensed by the AEC to handle uranium and had the necessary ventilation equipment installed to achieve good health conditions.

-- Nuclear Sci. Absts.

- 274 Environmental Contamination. M. S. Weinstein. HASL-58 (pp. 180-184). New York Operations Office. Health and Safety Lab., AEC. 5 pp.

Results of environmental pollution studies conducted at natural uranium processing facilities indicate little, if any, contamination of soil, water, or air. Estimates indicate a loss of about \$2,000,000 worth of uranium in stack effluents at three major facilities over a 14-year period. Examination of some of the economic aspects of environmental pollution control indicates the practicality of the installation of air cleaning equipment.

-- Nuclear Sci. Absts.

- 275 Radioactive Contamination in Wildlife. W. C. Hanson and J. J. Davis. HW-59500 (pp. 138-143). General Electric Co., Hanford Atomic Products Operation, Richland, Wash. 6 pp.

Radioactive contamination in terrestrial and aquatic wildlife in the environs of Hanford Atomic Products Operation is routinely measured by sampling indicator organisms. In addition, game species of birds and fish are sampled during periods when they contain maximum contamination and when they are available to sportsmen. During the past 3 years radioactive contamination levels in terrestrial organisms have remained comparable and levels in river organisms have increased slightly.

-- Nuclear Sci. Absts.

- 276 Detection of Genetic Trends in Public Health. H. B. Newcombe (Atomic Energy of Canada Ltd., Chalk River, Ont.). From pp. 157-168 of "Effect of Radiation on Human Heredity".

A procedure is described for the collection of specific data on variation in human populations. The procedure employs mechanical methods for matching and sorting punch cards which form a family register index. This register would contain information on the family relationships of the individuals who make up the population. Data would be easily

available on marriages, births arising out of these marriages, stillbirths, the death of offspring, marriages between first cousins, disease conditions, environment, socio-economic class, age of mother and father at time of birth, family size and spacing, racial origin, gestation period, legitimacy or illegitimacy, home or institution birth, and supplementary information. Eventual applications in long-range studies of the genetic consequences of radiation in human populations are discussed.

-- Nuclear Sci. Absts.

- 277 Radiation Screening Program. Summary Report for Period January 15, 1956 through January 15, 1959. J. Doull, V. Plzak and S. Brois. NP-7964. Chicago University Air Force Radiation Lab. 97 pp.

The purpose of the radiation screening program is to find chemical compounds which will reduce radiation injury and prevent mortality in irradiated animals. Each compound submitted for testing is investigated for both prophylactic and therapeutic activity against radiation injury in rats and mice. Agents which appear to be promising in the screening studies are investigated further using other species, different dosages of x- or gamma-radiation, and are also tested for protective activity against chronic irradiation exposure. Results are summarized on the radioprotective activity of approximately 500 compounds.

-- Nuclear Sci. Absts.

ENVIRONMENTAL MEASUREMENTS

- 278 Dustfall Measurements. A. M. Fisher.
Can. J. Public Health 50, 337-341 (Aug. 1959).

Dustfall measurements made at various locations should not be compared directly if the measurements have been made with gauges of different types. If the types are known, the use of a factor may permit a valid comparison. Factors for use with four common gauges are proposed.

-- Public Health Eng. Absts.

- 279 A Study of the Effects of Air Pollutants on the Eye. S. R. Mettler, et al.
A.M.A. Arch. Ind. Health 21, 13-18 (Jan. 1960).

Comprehensive objective studies have been made in this country and in England on the effect of relatively high concentrations of war gases on the anterior segment of the eye. Very little work has been reported on the ocular effects of noxious gases in the concentrations found in smogs. Previous studies of the eye effects of air pollutants have been restricted to the reporting of the degree of subjective irritation and lacrimation. In the present investigation rabbits were exposed to acrolein (2 ppm), ozone (2 ppm), sulfur dioxide (10 ppm), and nitrogen dioxide (20 ppm) acutely and chronically. The ophthalmologic and biochemical effects of these gases on intact and deepithelialized corneas were assayed. Under these conditions no effects were noticeable. The effect of these gases and presumably smog in general is at a lower subjective sensory level.

- 280 A Quantitative Ozone Test for Small Specimens. D. C. Edwards and E. B. Storey.
Chem. in Can. 11, 34-38 (Nov. 1959).

A new ozone test procedure is described which offers the advantages of simplicity, rapidity and sensitivity, and produces data capable of quantitative treatment. This test should prove useful in comparing antioxidants, in testing experimental polymers available only in small quantity and, combined with other test procedures, in the general laboratory evaluation of ozone resistance.

-- Authors' summary

- 281 Gas Chromatographic Analysis Shows Influence of Fuel on Composition of Automobile Exhaust. W. Hurn and T. C. Davis. *Proc. Am. Petrol. Inst.* 38, (3) 353-372 (1958).

Research has shown that smog and other comparable atmospheric irritants can be produced from automobile exhaust. Automobile exhaust is a complex mixture; not all of the materials in it are important in the air pollution problem, and there is a possibility that only a relatively few compounds or classes of compounds are responsible for most of its irritant-producing qualities. The type of fuel burned by an engine affects exhaust composition in varying degrees depending upon engine condition, engine operation, and other factors. The work here reported was done to obtain factual data concerning: (1) chemical differences in the exhaust products from different fuels; (2) the effect of engine speed and load on the differences. Experimental data were obtained with the use of a late model automotive V-8 engine on a dynamometer block. Fuels used included pure isooctane, commercial liquid petroleum gas (butane and propane separately), and 7 gasoline stocks from different refining processes. Data obtained by gas chromatography show that exhaust composition varies with engine speed and load. Differences in the composition of exhausts from different fuels are quantitatively small, but they are reproducible. These data cannot be construed as indicative that fuels do or do not differ in smog-forming potential. They outline compositional differences of interest to others to: (1) determine which components of the exhaust are important; (2) study measures which may be taken to make exhaust gas ineffective as a smog producer.

-- Cond. from APCA Absts.

- 282 Techniques for the Calibration of Atmospheric Analyzers. Production of Dilute Gas Streams by Diffusion. C. L. Gordon, H. Wong-Woo and H. L. Helwig. *Proc. 52nd Annual Meeting, APCA, Los Angeles, Calif.* 13 pp. (June 21-26, 1959).

The production of dilute gas mixtures by diffusion is useful for studies of gas phase reactions, biological exposure studies and calibration of atmosphere analyzers in the laboratory and field. In addition to the desirable characteristics of stability of output under controlled conditions and the wide range of attainable gas concentrations, the diffusion apparatus has the advantage of portability for some field uses. Of the field uses studied, the generation of dilute sulfur dioxide by diffusion for calibration purposes has been most successful. Production of dilute nitrogen dioxide by diffusion from solid nitrogen dioxide has limited usefulness in the field at present because of the need for a variable low temperature bath. The production of dilute ozone gas by diffusion from a stable ozone solution has the advantage of low contamination by oxygen and by nitrogen oxides for some purposes. However, dilute ozone produced by irradiation of air or oxygen is preferable for field calibration of oxidant analyzers.

-- APCA Absts.

- 283 Ultraviolet Determination of Nitrogen Dioxide as Nitrite Ion. A. P. Altshuller and A. F. Wartburg. *Anal. Chem.* 32, 174-177 (Feb. 1960).

An ultraviolet spectrophotometric procedure is developed for determining nitrogen dioxide in nitrogen gas. Nitrogen dioxide is converted to nitrite ion by absorption in alkaline potassium or sodium hydroxide solutions. The optical absorbance of the nitrite ion is measured at 355 millimicrons.

-- AC Briefs

- 284 The Concentration of Sulfur Dioxide in the Atmosphere near Power Stations. W. G. Cummins and M. W. Redfearn. *J. Inst. Fuel* 32, 358-363 (Aug. 1959).

Microquantities of sulfur dioxide were measured near 11 power stations using the Central Electric Research Laboratory (CERL) portable sulfur dioxide meter. (*J. Inst. Fuel* 30, 628, 1957). Sulfur dioxide levels were recorded with details of weather, wind speed, stack heights, station load and sulfur content of the fuel. Background levels of 0 to 0.01 ppm were measured. Maximum concentrations beneath the plumes and down wind various distances from the sources ranged from 0 to 0.3 ppm. The ability of the CERL portable sulfur dioxide meter to measure microquantities of sulfur dioxide, and its usefulness as a rapid survey meter is illustrated.

-- Public Health Eng. Absts.

PREVENTIVE ENGINEERING

- 285 Control of Organic Emissions from Surface Coating Operations. C. V. Kanter, et al. Proc. 52nd Annual Meeting, APCA, Los Angeles, Calif. 29 pp. (June 21-26, 1959).

At the present time no attempt is made to capture and recover organic solvents emitted to the atmosphere in industrial protective coating operations. This quantity is estimated to be in excess of 100 tons per day in Los Angeles County. Possible methods for controlling these emissions including condensation, absorption, chemical reactions, and vapor incineration are critically evaluated. The evaluation indicates that adsorption with activated carbon is the most feasible method. A pilot plant has been constructed with sufficient flexibility to determine the economic and technical aspects of adsorption, desorption, and solvent recovery. The design of the pilot plant, consisting of a water-wash spray booth, an activated carbon unit, a variable speed blower, a boiler, a superheater, and a condenser, and its operation are discussed. Preliminary investigations were made with three pure solvents—methyl ethyl ketone, toluene, and aliphatic mineral spirits. Complex solvent mixtures, typical of those found in various surface coating formulations, have been tested. Paints, lacquers, and enamels will also be sprayed so that optimum design parameters and standards can be established. Variables under investigation include the optimum carbon bed thickness, pressure drop through the bed, the type of pre-cleaners required to protect the carbon, optimum number of adsorbing vessels, the desorption requirements, over-all solvent recovery efficiency, capital costs, and operating expenses. -- APCA Absts.

- 286 Effects of Fuel Moisture and Incinerator Design on Effluents from Incinerators. R. L. Stenborg, R. R. Horsley, R. A. Herrick and A. H. Rose. Proc. 52nd Annual Meeting, APCA, Los Angeles, Calif., 33 pp. (June 21-26, 1959).

This report covers the second phase of a study directed toward development of incinerator design standards and criteria for minimizing discharge of atmospheric pollutants from multiple chamber incinerators. Tests were made to determine the effects of fuel moisture content on pollutant emissions from an experimental incinerator of fixed dimensions while varying the amount and distribution of combustion air, and the burning rate as measured by the amount of fuel charged per hour. Values obtained on an experimental incinerator with closely controlled combustion air, fuel feed rate, and operating conditions are primarily of qualitative value. Because of the basic chemical and physical laws involved, factors demonstrated by this study as affecting the increase or decrease of air pollutants should be the same as those affecting production of pollutants from larger scale incinerators. Since modifying influences can result from many conditions of design, construction, and operation, causative factors brought out by the tests require individual consideration and treatment.

-- APCA Absts.

- 287 Modifications to Reduce Emissions from a Flue-Fed Incinerator. E. R. Kaiser, J. Halitsky, M. B. Jacobs and L. C. McCabe. Proc. 52nd Annual Meeting, APCA, Los Angeles, Calif. 51 pp. (June 21-26, 1959).

The emissions of particulate matter, noxious gases, smoke and odor from flue-fed apartment-building incinerators contribute to the air pollution of cities and are a nuisance. A program of 38 tests was made on three flue-fed, single chamber, refuse incinerators in three apartment buildings to determine the amount of atmospheric pollution from the incinerator flues and the effectiveness of several appliances in reducing the emission of atmospheric contaminants from such incinerators. The daily refuse from 299 occupants of one building was 430 lb. average. The refuse had a bulk density of 4.1 lb./cu. ft. in the incinerator.

Each incinerator had an initial capacity of 275 lb. of refuse in normal loading. The residue averaged 37% of the weight of the charge. Metal, glass and ash constituted 76% of the residue, while combustibles were 16% and moisture was 8%. The flue gas was sampled and filtered throughout each test to determine the weight of solid particles and liquid droplets, which were reported together as particulate matter. The concentration of odor in the flue gas was determined by the ASTM perception threshold method. Major reductions in all emissions except odor were demonstrated.

-- APCA Absts.

COMMUNITY AIR HYGIENE

- 288 Air Pollution and Bronchitis. A. Roberts.
Am. Rev. Respirat. Diseases 80, Pt. I, 582-584 (Oct. 1959).

Although the term chronic bronchitis has been considered rather obsolete in diagnosis in this country, it is one in common use in Great Britain. There the term does not apply to benign and inconsequently bronchial trouble but to a progressive respiratory disorder in which the factor of bronchial disturbance is a constant denominator. As the bronchitic process advances, the lung parenchyma is involved and emphysema gradually develops. Cor pulmonale is often an associated complication. The importance of the chronic bronchitis syndrome in England and Wales lies in its socio-economic aspects. In a total population of 45 million, chronic bronchitis outranks all other respiratory diseases as acrippler and killer. It accounts for the loss of nearly 27 million working-man hours and is given as the cause of death in 30,000 certificates every year. The factors involved in the etiology of chronic bronchitis have been subjected to intensive scrutiny for many years and recently an apparent relationship of the disease to atmospheric pollution has been indicated by several studies. The author concludes that the incidence of chronic bronchitis is grossly underestimated in this country and perhaps over-diagnosed in Great Britain to some extent. When data now being obtained by improved survey methods in both countries become available, we may be able to establish a valid estimate on the importance of chronic bronchitis among us. With this knowledge we can then seek to clarify the relationship of the disease to air pollution in our cities.

-- APCA Absts.

- 289 Weather Modification and Smog. Part I. M. Neiburger.
Ind. Wastes 4, 61-65 (July 1959).

Three essentials for Los Angeles type smog are: (1) sources emitting pollution; (2) atmospheric conditions which prevent rapid transport of these pollutants in the atmosphere, and; (3) solar radiation for the photochemical reactions which transform pollutants into substances causing eye and respiratory irritation and damage to plants. Elimination of smog by weather modification is even more difficult or costly than control at the sources. The author describes inversions and the impracticability of attempting to modify this phenomenon.

-- Public Health Eng. Absts.

- 290 Control of Nitrogen Oxides in Boiler Flue Gases by Two-Stage Combustion. D. H. Barnhart and E. Diehl. Proc. 52nd Annual Meeting, APCA, Los Angeles, Calif. 15 pp. (June 21-26, 1959).

Two-stage combustion with auxiliary-air ports above the burners is an effective method for controlling the nitric oxide concentration in boiler flue gases while still maintaining acceptable boiler performance. While utilizing this method of operation, with 95% of the combustion air through the burners, the nitric oxide level was reduced nearly 30% with both oil and gas firing. A reduction of 47% occurred during full-load oil firing when the air flow

through the burners was 90%. The principal gains made in bringing nitric oxide under control are summarized graphically. It is apparent that two-stage combustion together with minor changes to the burner (approaching cone vanes out and air registers wide open) has given a total nitric oxide reduction of 56% when firing oil at full load. Similar results can be expected in gas firing. It appears that additional reductions in nitric oxide would be possible if the air flow through the burners were reduced another 5 or 10%. The limit would be reached when combustibles, carbon, carbon monoxide, etc., were detected at the furnace outlet, or when the burners become unstable. This suggests that it is important to have good operating guides for controlling the excess air in the boiler and for regulating the distribution of air between the burner and auxiliary air ports.

-- APCA Absts.

- 291 The Design of Smokeless Non-Luminous Flares. P. D. Miller, Jr., H. J. Hibshman and J. R. Connell. *Proc. Am. Petrol. Inst.* 38, (3), 276-281 (1958).

Many refineries are finding it increasingly difficult to meet public demands for limiting the amount of smoke and light from safety flares. Although steam injection can make a flare less objectionable, it is often prohibitively expensive to use an effective quantity of steam. A new flare, the multi-jet, has been developed which promises an economical solution to most flaring problems. The flare provides completely smokeless and noiseless burning, and its light is shielded by a stack 32 ft. in height. The multi-jet is usually sized to be smokeless and non-luminous for at least 95% of the expected occurrences of flaring. The flare stack is a steel shell lined with refractory material; the base of the flare is several feet above grade and contains one or more rows of multi-jet burners. These burners are of simple design and consist of a series of parallel pipes, or burner lines, which traverse the bottom of the stack; each burner line contains a row of small nozzles discharging vertically into the stack. Solid rods of refractory material are mounted above and parallel to the burner lines. The flared gases impinge against this rod, or flameholder, before they reach the ignition zone. During this period, enough air is mixed with the gas to give smokeless combustion. The paper presents complete design details of the flare.

-- APCA Absts.

- 292 A Car "Burning Problem" Solved. Anon. *Air Engineering* 1, 47-49 (Apr. 1959).

Open yard burning of junk automobile bodies is a nuisance in the vicinity of the yard area and a cause for complaint to air pollution control officials. In the New York City area, over 200,000 cars were thus burned annually; burning was banned by the city December 31, 1958. A company in Columbus, Ohio, developed a "Smokatron" that was shipped to New York. The unit is capable of burning 15 cars per hour, weighs 550,000 lbs., has a tunnel-like burning chamber and is 120 ft. long with a 30-ft. loading and discharge platform at each end. Cars pass the full length of the burning chamber on a double chain conveyor, are automatically ignited as they enter and are quenched with water sprays as they leave the discharge end burned out and ready to be pressed and baled. An electrical precipitator is contained in two 40-ft. high towers that straddle the burning chamber. Smoke passes through an intense field that is created between electrode wires in the center of 144 six-inch pipes and the pipes themselves. Particles are charged, collected on pipe walls and washed down the pipes by a built-in water spray at the end of the day. Odor is reduced below an objectionable level and smoke, soot and flyash are eliminated. No increase in manpower is required, no special training needed. Total cost of the Bronx installation was \$185,000. Operating cost is 65 cents per car.

-- Cond. from Public Health Eng. Absts.

- 293 Health Hazards of Automobile Exhaust. J. R. Goldsmith and L. H. Rogers. *Public Health Reports* 74, 551-558 (June 1959).

Of the substances which occur in automobile exhaust and their reaction products, hygienic standards have been established for industrial exposure to carbon monoxide, nitrogen dioxide, lead, and ozone. Establishing a full set of levels for community exposures to these substances is very difficult because of the sensitivity of frail or ill individuals, the indeterminate period of exposure, the effect of agents in combination, and the cumulative effect of exposure

from other sources, such as cigarette smoking. The hazard of automobile exhaust to the population of a large community will depend, among other things, on the extent and way that vehicles are used, and the meteorology of the area. In the absence of effective control for air pollution from automobile exhaust, the public health hazard should be evaluated.

-- Public Health Eng. Absts.

294 Maximum Permissible Concentration of Carbon Disulfide in the Atmospheric Air of Residential Districts. R. S. Gildenskiold. *Gigiena i Sanit.* 24, 3-8 (1959). Russian.

The field experience with the previously accepted maximum permissible concentrations of carbon disulfide in the atmospheric air (the maximum concentration at one time—0.5 mg./cu.m.; the daily average concentration—0.15 mg./cu.m.) has shown that these values were too excessive. These standards have been checked experimentally and new maximum permissible concentrations of carbon disulfide have been established on hygienic bases. The threshold value of smell sensation for carbon disulfide in the most sensitive person comprises 0.05 mg./cu.m. The reflex action by the method of optic chronaxy and adaptation to darkness, has been obtained with threshold values of 0.04 mg./cu.m. The sub-threshold concentration was 0.03 mg./cu.m. On the basis of these investigations the author recommends to accept 0.03 mg./cu.m. as the maximum permissible concentration of carbon disulfide in atmospheric air. The examination of the atmospheric air in the vicinity of an artificial viscose fiber plant, devoid of any air purifying installations, has shown the air to be heavily polluted with carbon disulfide within a radius of 1,000 m. (0.04 mg./cu.m.) with the spreading of gas to a distance of 3,000 m. (0.03 mg./cu.m.).

-- Bull. Hyg.

MANAGEMENT ASPECTS

295 Westinghouse Management Health Examinations—Their Investment Value. H. B. Burr. *J. Occ. Med.* 2, 80-91 (Feb. 1960).

For Westinghouse and many other companies, comprehensive periodic management health examinations offer an important investment opportunity. In addition to returns in management morale—which, in themselves, may far outweigh examination cost—such examinations make for great savings in company expenditures for employee disability benefits. When employee group life insurance, hospitalization and surgical insurance, sickness and accident insurance, major-medical insurance, disability salary extension, and workmen's compensation expenses are borne entirely by the company, broad-scale management health examinations offer prospective savings in employee disability benefits of four times or more the cost of the examinations. Under these circumstances, progressive managements readily will recognize that comprehensive periodic health examinations have the attributes of a high-priority objective—certainly for all management personnel; perhaps for other employees as well.

-- Author's conclusion

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ACCIDENTS AND PREVENTION

- 296 Injury Frequency in Pulpwood Logging Unchanged over Decade. Anon.
Safety Standards 8, 15 (Nov.-Dec. 1959).

While all-manufacturing injury frequency rates declined by more than a third, the rates in pulpwood logging were virtually the same in 1955 as in 1944, reports the U.S. Labor Department's Bureau of Labor Statistics in a study of work accident experience in the same industry over a decade later. Actually the 1955 rate of 76.2 disabling injuries per million man-hours worked was slightly higher than the 1944 rate of 75.5 but may be accounted for by changes in the sample rather than by increases in injury volume. Another disturbing factor is revealed by comparisons of pulpwood logging with general logging experience. Since 1944 logging operators, other than in pulpwood, have reduced their frequency rate from 94.6 to 82.3 while the pulpwood rate for the two years, although lower, did not change significantly. In both years cuts and lacerations accounted for the largest number of injuries while accidents to legs, feet, and toes were more prevalent than to any other part of the body. The 1955 study indicated that work injuries were much less severe for pulpwood logging than, say, for the production of sawlogs. The highest frequency rate occurred in pulpwood logging operations employing fewer than 20 people. Loaders were injured more often than any other occupation, while skidding employees, next to cookhouse crews, had the highest severity rates.

- 297 Automation Won't Eliminate Accidents. Anon. Safety Standards 8, 5 (Nov.-Dec. 1959). This abstract is from a background paper by Secretary of Labor, James P. Mitchell, prepared for the 1959 National Safety Congress whose theme is "Safety in the Sixties".

Contrary to the widely held opinion that automation will resolve most, if not all, of industrial accident prevention problems, it appears more likely that its effect upon the over-all volume of work injuries will not be great. Automation will reduce the hazards to which machine operators are exposed. It will eliminate many of the manual material-handling operations which have always been productive of large numbers of injuries. Injuries from these sources, undoubtedly, will decline. On the other hand, automation will bring a sharp increase in the volume of machine maintenance work. Unfortunately, maintenance work is hazardous. All data available to the Department of Labor indicate that maintenance workers have a higher incidence of injuries than either machine operators or manual laborers. These are the people who must work on machines when the guards are down. Everything else being equal, it is probable that the increased volume of injuries to maintenance workers may offset, in large part, the reduction in injuries to machine operators and laborers. Thus one accident-prevention problem may simply be traded for another. In summary, automation is not expected to bring a significant reduction in the over-all totals of work injuries during the next 10 years although there may be striking improvement in the areas where automation, as opposed to simple mechanization, is found economically feasible.

- 298 The Chemist's Check List for Safety Inspections. J. Guelich and W. C. Koch.
Ind. Eng. Chem. 52, 69A-72A (Feb. 1960).

Safety inspections, by the chemist or other persons charged with this responsibility are sometimes aimless affairs in which the individual wanders through the area making notes that are meaningful only to him and lacking comparison with both previous conditions and standards established for the area. Evolution of a chemist's check list for safety inspections will enable the chemist to make a systematic inspection in which no important points are overlooked, to institute action on substandard conditions or practices, and to communicate his findings in an orderly fashion to his colleagues. A sample check list is presented in this article.

-- Editor's summary

MISCELLANEOUS

- 299 Treatment of Spent Pickle Liquors by Electrodialysis. D. J. Lewis and F. L. Tye.
J. Appl. Chem. (London) 9, 279-292 (May 1959).

The disposal of spent liquors from the pickling of iron by an electrodialytic process is described, sulfuric acid of a concentration suitable for re-use and metallic iron being recovered. The power cost of the treatment is a function of the current efficiency and the voltage across the cell. Current efficiencies for various concentrations of recovered acid are experimentally obtained and shown to apply to all pickle liquor compositions. Experiments on one synthetic pickling liquor have established a basis for calculating the cell voltage. It is then possible to deduce the quantitative effect on the power cost of the treatment, of operating procedure, electrode-membrane distances, the iron content of the treated liquor, the proportion of iron in the spent pickle liquor and the total concentration of the spent liquor.

-- Public Health Eng. Absts.

- 300 Plating Waste Disposal. Integrated System at Ronson Corporation. W. Mikos and A. Szkudiapski. Metal Finishing 57, 61-64 (Feb. 1959).

The system described is based on the chemical treatment of the toxic compounds (cyanide, chromic acid, etc.) and their removal from the work and racks before rinsing. The treatment tank is an integral part of the finishing line and is constantly recirculated to a larger treatment solution reservoir. The chemicals consumed are replenished by additions at the reservoir tank and the precipitated salts removed by settling.

-- Public Health Eng. Absts.

- 301 Secondary Petrochemical Processes as Waste Sources. E. R. Wright.
Sewage and Ind. Wastes 31, 574-579 (May 1959).

Wastes from secondary petrochemical processes such as oxidation, chlorination, polymerization, hydrogenation, nitration or other chemical transformations of petroleum-based hydrocarbons are results of by-product formation, side reactions, incomplete reactions or mechanical losses. These are discussed and details are given on a typical process for converting ethane to perchloroethylene and carbon tetrachloride by chlorination, showing the types and sources of wastes caused by the above factors.

-- Public Health Eng. Absts.

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