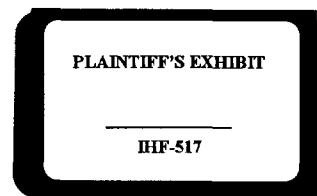


*Dr. C. J. Bishop - Newark
Plant*



Industrial Hygiene Digest

INDUSTRIAL HEALTH NEWS

LITERATURE ABSTRACTS

MEDICAL

ENGINEERING

CHEMICAL

TOXICOLOGICAL

LEGAL

OCTOBER, 1968

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INDUSTRIAL HYGIENE FOUNDATION



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Industrial Hygiene Foundation assumes no responsibility for statements in articles abstracted in this Digest or for material from other organizations which may be sent to members from time to time. The Digest's condensation of articles as well as literature not originating within the Foundation, are made available to our members solely for their information, by way of keeping them posted on developments.

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FOUNDATION FACTS

NEW MEMBERS: IHF welcomes DL Skin Care Products, Inc. into membership.

MEETINGS: The importance of sound scientific management of environmental and occupational health problems was emphasized in papers presented by outstanding speakers in the fields of industrial hygiene, law, rehabilitation, industrial engineering, mental health research and industrial medicine at the Foundation's 33RD ANNUAL MEETING held October 15-16, 1968 at Chatham Center, Pittsburgh, Pa. Transactions of the meeting will be published early in 1969.

At the ANNUAL BUSINESS MEETING OF MEMBERS October 15, the new By-Laws, voted upon and accepted by the Board of Trustees at their May 3 meeting, were ratified by the membership. Consistent with the new By-Laws, Trustees were elected for a one, two or three year term to effect a Trustee rotation plan. New members elected to the Board are: Walter P. Cartun, Westinghouse Air Brake Division, Westinghouse Air Brake Company; R. Verne Richter, General Motors Corporation; and William L. Sutton, M.D., Eastman Kodak Company.

Officers elected at the October 15 BOARD OF TRUSTEES MEETING are:

Chairman: G. Arthur Webb, Ph.D. Mellon Institute of Carnegie-Mellon University	
Vice Chairman: Miles O. Colwell, M.D. Aluminum Company of America	Past Chairman: E. K. Davison Davison Sand and Gravel Company
Andrew Kalmykow American Insurance Association	Secretary: H. H. Schrenk, Ph.D.
Treasurer: Edward R. Weidlein, Jr. Union Carbide Corporation	
President: Robert T. P. deTreville, M.D.	Executive Vice President: Harry M. Bowman

STAFF ACTIVITIES: Dr. deTreville attended the AMA Congress on Occupational Health, September 30-October 1 in New York. Drs. deTreville and B. J. Lambiotte (IHF Resident in Occupational Medicine) completed epidemiological field studies in the Newark plant of Owens-Corning Fiberglass Corporation to which Dr. Jon L. Konzen, Medical Director of OCF, referred in his talk at the 33rd Annual Meeting, and participated in orientation meetings for the Licking County Medical Society. Dr. deTreville and Roger Wolfe (independent film and television producer in Pittsburgh for Post Graduate Medical Television Teaching Programs) conducted a dialogue on IHF as a presentation before the Oakland Rotary Club on October 31 in preparation for a post graduate closed circuit medical television program.

IHF FELLOWSHIP GRANT: A grant of \$8,000 was awarded to the University of California, Berkeley by the Foundation to help support research in the Division of Environmental Health Sciences, School of Public Health, which deals with electron microscopic observations on the behavior of fibrous particles in filter media.

IHF ADVISORY FELLOW: Retiring Trustee Dr. James H. Sterner, Chairman of the Department of Environmental Health, School of Public Health, University of Texas, has agreed to serve as an Advisory Fellow to assist IHF programs of biostatistical and epidemiological research. Formerly Medical Director of Eastman Kodak Company, Dr. Sterner was elected to the Foundation's Board of Trustees in 1966 and his biosketch appeared in the Industrial Hygiene Digest in November 1966.

FOREIGN VISITOR: Dr. Francisco Briggs Pecanha, Medical Director of Esco Brazil, an affiliate of Standard Oil Company of New Jersey, visited Dr. Paul Gross, Director of IHF Research Laboratory, and Dr. deTreville on October 30.

FIBROUS DUST SEMINAR: A highly technical research seminar on the bioeffects of asbestos and certain other fibrous dusts sponsored by IHF and Mellon Institute will be held November 22 at Mellon Institute (see Editorial, p. 1, this issue).

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REPRINTS AVAILABLE: "Symptomatic Alveolar Mural Sclerosis," Paul Gross and Patrick J. Clancy, Arch. Environ. Health 16:728-733, May 1968. "Ferruginous Bodies in Human Lungs: Prevalence at Random Autopsies," Michael D. Utidjian, Paul Gross, and Robert T. P. deTreville, Arch. Environ. Health 17:327-333, Sept. 1968. "Alveolar Proteinosis: Its Experimental Production in Rodents," Paul Gross and Robert T. P. deTreville, Arch. Path. 86:255-261, Sept. 1968.

PUBLICATIONS: The Third Quarterly Report—1968 is attached to this issue of Industrial Hygiene Digest.

INDUSTRIAL HYGIENE FEATURES

Short term treatment of acute bursitis of the shoulder is discussed in Abst. No. 933.

Abst. No. 936 reviews the natural history of tuberculosis in the human body.

Abst. No. 938 is concerned with occupation, education, and coronary heart disease.

Abst. No. 939 investigates the effect of licorice on hypertension.

Cigarette smoking during pregnancy is discussed in Abst. No. 950.

Pulmonary complications of the burn patient are studied in Abst. No. 962.

Abst. No. 965 reports on nickel earlobe dermatitis.

Information on myocardial toxicity from carbon monoxide poisoning is given in Abst. No. 968.

The effect of arsenic on inflammation is described in Abst. No. 976.

Abst. No. 989 presents the experimental production of alveolar proteinosis in rodents.

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EDITORIAL

3rd FIBROUS DUST SEMINAR

In the past six years, since coming to the Foundation, no single environmental health problem has consumed as much attention on the part of the Foundation as has the question of adverse health effects of asbestos and certain non-asbestos fibrous dusts.

Asbestos shares with silica the ability to produce fibrosis in experimental animals and in man on a similar dose/time exposure basis; but it also has been shown to increase by a factor of about ten times the likelihood of lung cancer in asbestos exposed textile and insulation workers. In addition pleural mesotheliomas have been reported in individuals whose exposure to asbestos has not been occupational, in whom asbestosis has not been found, and in whom the average exposure time has tended to be longer than that required to produce fibrosis and/or lung cancer in workers exposed to hazardous concentrations. Progress in research planning in Industrial Hygiene Foundation, the United States Public Health Service, and Quebec Asbestos Mining Association was reviewed in the Foundation's Medical Series Bulletin No. 11 in 1967 and in an editorial earlier this year (Industrial Hygiene Digest, May, 1968). Under separate cover official representatives of Foundation members have been advised of the program of the Foundation's 3rd Fibrous Dust Seminar, to be held November 22 at Mellon Institute. Researchers from the Mellon Institute of Carnegie-Mellon University, the Department of Occupational Health of the University of Pittsburgh Graduate School of Public Health, the University of California at Berkeley and the United States Public Health Service in conjunction with several invited scientists from other countries, will review preliminary research findings and evaluate their significance in order to be in a position to apply what is already known to the best practical advantage and to help direct future research efforts. Significant findings will be presented later in appropriate publications.

While only a few Foundation members mine or manufacture asbestos, control of recognized asbestos hazards associated with industrial operations, products and wastes must be of general concern to industry. Those desiring to attend this Industrial Hygiene Foundation meeting should contact their company's official IHF liaison representative for further information. (See Fibrous Dust Seminar Program on p. 11, this issue).

--R. T. P. deT

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FIBROUS DUST SEMINAR

sponsored by

INDUSTRIAL HYGIENE FOUNDATION / MELLON INSTITUTE

November 22, 1968

Conference Room, Mellon Institute

9:00 a.m. WELCOME

Robert T. P. deTreville, M.D., President, IHF, and
G. A. Webb, Ph.D., Associate Director, M.I.-CMU,
Chairman of the Board, IHFMorning Session: FIBROUS GLASS HEALTH RESEARCH IN THE UNITED STATES

Moderator: W. Clark Cooper, M.D., School of Public Health, University of California

9:10 a.m. IHF Statistical Studies of Health of
Fibrous Glass WorkersH. Michael D. Utidjian, M.D., Asst. Professor,
Dept. of Epidemiology, Graduate School of Public
Health, University of Pittsburgh9:35 a.m. NIMA Statistical Studies of Health
of Fibrous Glass WorkersLewis J. Cralley, Ph.D., Scientist Director,
Assoc. Chief, Occ. Health Program, Field
Studies, U.S. Public Health Service

10:00 a.m. Session Break

10:15 a.m. Pathological Studies of Respirable
Fibrous Glass Dust With and With-
out Phenol Formaldehyde and
Textile Binders

Paul Gross, M.D., Director of IHF Research Lab.

10:45 a.m. Physiological Studies of Health of
Fibrous Glass WorkersBenjamin J. Lambiotte, M.D., IHF Resident
Fellow in Occ. Med.11:10 a.m. Radiological Studies of Health of
Fibrous Glass WorkersJon L. Konzen, M.D., Medical Director,
Owens-Corning Fiberglas Corp.

11:35 a.m. Summarisation - Morning Session

W. Clark Cooper, M.D.

12:00 noon LUNCH

Afternoon Session: BIOEFFECTS RESEARCH FOR UNITED STATES ASBESTOS INDUSTRYModerator: Lewis J. Cralley, Ph.D., Scientist Director, Associate Chief, Occupational Health
Program, Field Studies, U.S. Public Health Service1:30 p.m. Asbestos Exposure in the U.S.
Textile Industry—1930 to dateJoseph L. Goodman, M.D., Medical Director
for Research, Raybestos-Manhattan, Inc.1:55 p.m. Statistical Studies of U.S.
Asbestos Textile WorkersPhilip E. Enterline, Ph.D., Professor of
Biostatistics, Graduate School of Public Health,
University of Pittsburgh2:20 p.m. Studies of the Pathogenicity of
Synthetic and Natural Asbestos and
Brake Drum Dust: Progress Report

Paul Gross, M.D.

3:00 p.m. Pathological Studies of Ferruginous Bodies

Methodology
Instrumentation
Basic ConsiderationsH. Michael D. Utidjian, M.D.
Martin N. Haller, Fellow, Mellon Institute-CMU
John M. G. Davis, Ph.D., Dept. of Pathology,
University of Cambridge, England

Discussion

Paul Gross, M.D.

4:00 p.m. Summarization - Afternoon Session

Lewis J. Cralley, Ph.D.

4:20 p.m. Concluding Remarks

Robert T. P. deTreville, M.D.

4:30 p.m. ADJOURNMENT

See Notice of Intended Changes

THRESHOLD LIMIT VALUES FOR 1969

Adopted at the 36th Annual Meeting of the American Conference of Governmental Industrial Hygienists, St. Louis, Missouri, May 13, 1969.

The Threshold Limit Values refer to air-borne concentrations of substances and represent conditions under which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect. Because of wide variation in individual susceptibility, exposure of an occasional individual at or even below the threshold limit may not prevent discomfort, aggravation of a pre-existing condition, or occupational illness.

Clinical tests are becoming available that permit detection of those individuals who will hyperreact upon exposure to certain industrial substances. Being predictive in character, they may be applied as screening tests in the preplacement job examination. Requests for further details of these tests should be directed to the Chairman of the Committee.

Threshold limits should be used as guides in the control of health hazards and should not be regarded as fine lines between safe and dangerous concentrations. Exceptions are the substances given in Appendix A and certain of the substances given a "C" rating. The values not given a "C" rating refer to time-weighted average concentrations for a conventional 7 or 8 hour workday.

Time-weighted average concentrations permit excursions above the limit, provided they are compensated by equivalent excursions below the limit during the work day. The degree of permissible excursion is pegged to the threshold limit value of the particular substance as given in Table in Appendix C under "Test TLV Factor". Hence, it is not considered appropriate to interpret air concentration values as exceeding time-weighted average limits, if such values lie within the permissible excursions. (See section on Legislative Code.)

The amount by which these concentrations may be exceeded for short periods without injury to health depends upon a number of factors such as the nature of the contaminant, whether very high concentrations even for short periods produce acute poisoning, whether the effects are cumulative, the frequency with which high concentrations occur, and the duration of such periods. All must be taken into consideration in arriving at a decision as to whether a hazardous situation exists. Enlightened industrial hygiene practice inclines toward controlling exposures below the limit rather than maintenance at the limit.

Threshold limits are based on the best available information from industrial experience, from experimental human and animal studies, and where possible, from a combination of the three. The basis on which the values are established may differ from substance to substance; protection against impairment of health may be the guiding factor for some, whereas reasonable freedom from irritation, nausea, nuisance or other forms of stress may dominate the basis for others. The Committee holds to the opinion that limits based on physical irritation should be considered far less limiting than those based on

physical impairment, growing bodies of evidence indicate that physical irritation may promote and accelerate physical impairment.

These limits are intended for use in the field of industrial hygiene and should be interpreted and applied only by persons trained in this field. They are not intended for use, or for modification for use, (1) as a relative index of toxicity, by making a ratio of two limits, (2) in the evaluation or control of community air pollution or air pollution nuisances, (3) in estimating the toxic potential of continuous uninterrupted exposures, (4) as proof or disproof of an existing disease or physical condition, or (5) for adoption by countries whose working conditions differ from those in the United States of America and where substances and processes differ.

Documentation of Threshold Limit Values. A separate companion piece to the TLVs is issued by ACGIH under this title. This publication gives the pertinent scientific information and data with reference to literature sources that were used to base each limit. Each documentation also contains a statement defining the type of response against which the limit is safeguarding the worker. For a better understanding of the TLVs it is essential that the Documentation be consulted when the TLVs are being used.

Ceiling vs Time-Weighted Average Limits. Although the time-weighted average concentration provides the most satisfactory, practical way of monitoring air-borne agents for compliance with the limits, there are certain substances for which it is inappropriate. In the latter group are substances which are predominantly fast acting and whose threshold limit is more appropriately based on this particular response. Substances with this type of response are best controlled by a ceiling "C" limit that should not be exceeded. It is implicit in these definitions that the manner of sampling to determine compliance with the limits for each group must differ; a single brief sample, that is applicable to a "C" limit, is not appropriate to the time-weighted limit. Here, a sufficient number of samples are needed to permit a time-weighted average concentration throughout a complete cycle of operations or throughout the work shift.

Whereas the ceiling limit places a definite boundary which concentrations should not be permitted to exceed, the time-weighted average limit requires an explicit limit to the excursions that are permissible above the listed values. The magnitude of these excursions may be pegged to the magnitude of the threshold limit by an appropriate factor shown in Appendix C. It should be noted that the same factors are used by the Committee in making a judgment whether to include or exclude a substance for a "C" rating.

"Skin" Notation. Listed substances followed by the designation "Skin" refer to the potential contribution to the over-all exposure by the cutaneous route including mucous membranes and eye, either by air-borne, or more particularly, by direct contact with the substance. Vehicles can alter skin absorption.

This attention-calling designation is intended to suggest appropriate measures for the prevention of cutaneous absorption so that the threshold limit is not invalidated.

These values are reviewed annually by the Committee on Threshold Limits for revision or additions, as further information becomes available.

Mixtures. Special consideration should be given also to the application of these values in assessing the health hazards which may be associated with exposure to mixtures of two or more substances. A brief discussion of basic considerations involved in developing threshold limit values for mixtures, and methods for their development, are amplified by specific examples are given in Appendix B.

"Inert" or Nuisance Particulates. A number of dusts or particulates that occur in the working environment ordinarily produce no specific effects upon prolonged inhalation. Some insoluble substances are classed as inert (e.g. iron and steel dusts, cement, silicon carbide, titanium dioxide, cellulose), others may be soluble (starch, soluble oils, calcium carbonate) but are of such a low order of activity that in concentrations ordinarily encountered do not cause physiologic impairment, still others may be rapidly eliminated or destroyed by the body (vegetable oils, glycerine, sucrose). In the case of the insoluble substances, there may be some accumulation in the respiratory passages. In the case of the soluble substances, this accumulation will ordinarily be temporary but may interfere to some extent with respiratory processes. Hence, it is desirable to control the concentrations of such particulates in the air breathed by any individual, in keeping with good industrial hygiene practice.

A threshold limit of 15mg/m³ or 50 mppcf, whichever is less, is recommended for substances in these categories and for which no specific threshold limits have been assigned. This limit, for a normal work day, does not apply to brief exposures at higher concentrations. Neither does it apply to those substances which may cause physiologic impairment at lower concentrations but for which a threshold limit has not yet been adopted. Some "inert" particulates are given in Appendix D.

Simple Asphyxiants - "Inert" Gases or Vapors. A number of gases and vapors, when present in high concentrations in air, act primarily as simple asphyxiants without other significant physiologic effects. A TLV may not be recommended for each simple asphyxiant because the limiting factor is the available oxygen. The animal oxygen content should be 18 percent by volume under normal atmospheric pressure (equivalent to a partial pressure, pO₂, of 135 mm Hg). Atmospheres deficient in O₂ do not provide adequate warning and most simple asphyxiants are odorless. Several simple asphyxiants present an asphyxiation hazard. Accents should be taken of this factor in limiting the concentration of the asphyxiant.

Physical Factors. It is recognized that such physical factors as heat, ultraviolet and ionizing radiation, humidity, abnormal

Substance	ppm	Mg/M ³	Substance	ppm	Mg/M ³	Substance	ppm	Mg/M ³
Lithium hydride	-	0.025	Nicotinic acid	-	0.5	Products	-	-
L. P. G. (Liquified petroleum gas)	1,000	1,600	Nitric acid	2	5	Propane	1,000	1,600
Magnesium oxide fume	-	15	Nitric oxide	25	30	Propyl acetate	-	-
Malathion-Skin	-	15	n-Nitroaniline-Skin	1	6	Propyl alcohol	200	840
Malic acid	0.25	1	Nitrobenzene-Skin	1	5	Propyl nitrate	25	110
Manganese	-	5	p-Nitrochlorobenzene-Skin	100	310	Propylene dichloride	75	350
Mercury-Skin	-	0.1	Nitroethane	5	9	Propylene oxide	2	5
Mercury (organic compounds)-Skin	-	0.01	Nitrogen dioxide	10	29	Propylene sulfide	100	240
Methyl acetate	25	100	Nitrogen trifluoride	100	250	Pyrene, see Methylacetylene	-	-
Methanol, see Methyl mercaptan	-	15	Nitrobenzene	25	90	Pyridine	-	-
Methyl alcohol	200	610	2-Nitropropane	25	90	Quinone	5	15
Methyl acetylene-propylene mixture	1,000	1,650	2-Nitropropane	-	-	Radium, metal fume and dusts	0.1	0.4
Methyl acrylate-Skin	1,000	1,600	Nitrobenzene-Skin	5	30	Soluble salts	-	-
Methylal (dimethylmethane)	10	35	Nitrobenzene-Skin	-	-	Solvent	-	-
Methyl alcohol (methanol)	1,000	3,100	Nitrobenzene-Skin	-	-	Solvents (commercial)	-	-
Methylamine	800	260	Nitrobenzene-Skin	-	-	Selenium compounds (as Se)	-	-
Methyl amyl alcohol, see Methyl isobutyl alcohol	10	12	Nitrobenzene-Skin	-	-	Selenium hexafluoride	0.05	0.4
Methyl bromide	100	465	Nitrobenzene-Skin	-	-	Silver, metal and soluble compounds	-	-
Methyl bromide-Skin	20	80	Nitrobenzene-Skin	-	-	Sodium fluoroacetate (1000)-Skin	-	-
Methyl butyl ketone, see 2-Heptanone	25	80	Nitrobenzene-Skin	-	-	Sodium hydrosulfide	0.1	0.5
Methyl cellosolve-Skin	25	120	Nitrobenzene-Skin	-	-	Starch	500	2,900
Methyl cellosolve acetate-Skin	100	210	Nitrobenzene-Skin	-	-	Styrene	100	420
Methyl chloride	350	1,300	Nitrobenzene-Skin	-	-	Sulfur hexafluoride	5	13
Methyl chloroform	500	2,000	Nitrobenzene-Skin	-	-	Sulfuric acid	1,000	6,000
Methyl cyclohexane	100	470	Nitrobenzene-Skin	-	-	Sulfur monochloride	1	6
Methyl cyclohexane-Skin	100	460	Nitrobenzene-Skin	-	-	Sulfur pentachloride	0.025	0.25
Methyl ethyl ketone (MEK), see 2-Butanone	100	250	Nitrobenzene-Skin	-	-	Sulfur trioxide	5	20
Methyl formaldehyde	5	20	Nitrobenzene-Skin	-	-	Synthetic	-	-
Methyl iodide-Skin	25	100	Nitrobenzene-Skin	-	-	Tar	-	-
Methyl isobutyl carbonyl-Skin	0.02	0.05	Nitrobenzene-Skin	-	-	Tellurium	-	-
Methyl isobutyl ketone, see Hexane	10	20	Nitrobenzene-Skin	-	-	Tellurium hexafluoride	0.02	0.2
Methyl isocyanate-Skin	100	410	Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
Methyl mercaptan	100	400	Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
Methyl methacrylate	500	1,740	Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
Methyl methyl ketone, see 2-Pentanone	100	400	Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
Methyl nitrobenzene	0.02	0.2	Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
Methyl nitrobenzene (MDM)	500	1,740	Nitrobenzene-Skin	-	-	Tetralin	-	-
Methyl nitrobenzene (dichloromethane)	-	-	Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
Methyl nitrobenzene (soluble compounds)	-	-	Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
Monoethyl aniline-Skin	2	9	Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
Monoethyl hydrazine-Skin	0.2	0.35	Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
Naphthalene-Skin	20	70	Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
Naphthalene (coal tar)	100	400	Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
Naphthalene	10	50	Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
n-Naphthylamine	-	-	Nitrobenzene-Skin	-	-	Tetralin	-	-
Nickel carbonyl	0.001	0.007	Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
Nickel, metal and soluble compounds	-	1	Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
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			Nitrobenzene-Skin	-	-	Tetralin	-	-
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			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
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			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
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			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
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			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
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			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
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			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin	5	35
			Nitrobenzene-Skin	-	-	Tetralin	-	-
			Nitrobenzene-Skin	-	-	Tetralin decomposition products	-	-
			Nitrobenzene-Skin	-	-	Tellurium hexafluoride	-	-
			Nitrobenzene-Skin	-	-	TEPP-Skin	-	-
			Nitrobenzene-Skin	-	-	Tetraphenyls	1	9
			Nitrobenzene-Skin	-	-	1,1,1,2-Tetrachloro-2,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloro-1,2-difluoroethane	500	4,170
			Nitrobenzene-Skin	-	-	1,1,2,2-Tetrachloroethane-Skin		

.. See Notice of Intended Changes

• 1968 Addition

See Number of Intended (hanger)

NOTICE OF INTENDED CHANGES

These substances, with their corresponding values, comprise those for which either a limit has been proposed for the first time, or for which a change in the "Recommended" limit has been proposed. In all cases, the proposed limits should be considered as tentative and will remain in this listing for a period of at least two years. During this time, the previously Recommended limit will remain in effect. If, after two years, no evidence comes to light that questions the appropriateness of the values herein, the values will be placed in the "Recommended" list. Documentation is available for each of these substances.

MINERAL DUSTS

Substance	ppm	mg/m ³
Asbestos	5	15
Chrysotile	5	15
Amphibole, including natural fibrous earth	5	15
Tremolite	5	15

Quartz, Threshold Limit calculated from the formula $\frac{250}{f}$

Substance	ppm	mg/m ³
Asbestos	5	15
Mica	20	60
Serpentine	20	60
Talc	20	60
Perlite	50	150
GRAPOLITE (natural)	15	45
"Hard" or fibrous Particulates	50 (or 15 mg/m ³ whichever is the smaller)	150 (or 45 mg/m ³)

See Appendix D
Conversion factors
ppm x 35.3 = million particles per cubic meter
mg/m³ x 0.028 = particles per c.c.

MINERAL DUSTS

Substance	ppm	mg/m ³
Thallium (soluble compounds) - Skin	0.1	0.1
Thallium	5	15
Tin (inorganic compounds, except oxides)	2	6
Tin (organic compounds)	0.1	0.1
Titanium dioxide	15	45
Titanium (total)	750	2250
Toluene-2,4-dinitrophenol	0.02	0.06
Toluene-2,4-dinitrophenol	5	15

Chrysotile

Substance	ppm	mg/m ³
Asbestos	5	15
Mica	20	60
Serpentine	20	60
Talc	20	60
Perlite	50	150
GRAPOLITE (natural)	15	45
"Hard" or fibrous Particulates	50 (or 15 mg/m ³ whichever is the smaller)	150 (or 45 mg/m ³)

See Appendix D
Conversion factors
ppm x 35.3 = million particles per cubic meter
mg/m³ x 0.028 = particles per c.c.

MINERAL DUSTS

Substance	ppm	mg/m ³
Asbestos	5	15
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GRAPOLITE (natural)	15	45
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See Appendix D
Conversion factors
ppm x 35.3 = million particles per cubic meter
mg/m³ x 0.028 = particles per c.c.

Radioactivity: For permissible concentrations of radionuclides in air, see U.S. Department of Commerce, National Bureau of Standards, Handbook 69, "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure," June 5, 1959. Also, see U.S. Department of Commerce National Bureau of Standards, Handbook 59, "Permissible Dose from External Sources of Ionizing Radiation," September 24, 1954, and addendum of April 15, 1956.

a) Millions of particles per cubic foot of air, based on sampling complete except by light-field technique.
b) The percentage of crystalline silica in the sample is the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.

See Notice of Intended Changes

1968 Addition

a) Parts of vapor or gas per million parts of contaminated air by volume at 25°C and 760 mm. Hg pressure.
b) Approximate milligrams of particulates per cubic meter of air.

1968 Revision
1968 Addition

NOTICE OF INTENDED CHANGES (CONTINUED)

Substance	ppm	mg/m ³
Petroleum distillates	h) A6	-
Propagyl alcohol - Skin	1	1.5
RDX - Skin	200	-
Standard Solvent	50	0.100 l)
Syring	-	0.150 l)
Tetraethyl lead (as Pb) - Skin	25	-
Tetraethyl lead (as Pb) - Skin	-	-
Tetraethyl benzene	-	-
Tungsten & compounds, as W	-	-
Soluble	-	1
Insoluble	-	5
Uranium, sol. & insol. compounds as U...	-	0.2

Appendix A

- A¹ Benzidine. Because of high incidence of bladder tumors in man, any exposure, including skin, is extremely hazardous.
- A² β-Naphthylamine. Because of the extremely high incidence of bladder tumors in workers handling this compound and the inability to control exposure, β-naphthylamine has been prohibited by the State of Pennsylvania from manufacture, use and other activities that involve human contact.
- A³ N-Nitrosodimethylamine. Because of extremely high toxicity and presumed carcinogenic potential of this compound, contact by any route should not be permitted.
- A⁴ Polynuclear aromatic hydrocarbons. Because of extremely high toxicity and presumed carcinogenic potential of this compound, contact by any route should not be permitted.
- A⁵ β-Propiolactone. Because of high acute toxicity and demonstrated skin tumor production in animals, contact by any route should be avoided.
- A⁶ Gasoline and/or Petroleum Distillates. The composition of these materials varies greatly and thus a single TLV for all types of these materials is no longer applicable. In general, the aromatic hydrocarbon content will determine what TLV applies. Consequently the content of benzene, other aromatics and additives should be determined to arrive at the appropriate TLV (Eklund, et al. A.I.N.A.J. 24, 60, 1963).

*Trade Names: Algodon, Flum, Halm, Teflon, Tetran

Appendix B

B.1 THRESHOLD LIMIT VALUES FOR MIXTURES

When two or more hazardous substances are present, their combined effect, rather than that of either individually, should be given primary consideration. In the absence of information to the contrary, the effects of the different hazards should be considered as additive. That is, if the sum of the following fractions,

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n}$$

(2) "Total dust" respirable and nonrespirable:

$$\frac{10 \text{ mg/m}^3}{\% \text{ Respirable Quartz} + 2}$$

Use one-half the value calculated from formula for quartz.

1) As determined by the membrane filter method at 430 X phase contrast magnification.

2) As counted by the standard impinger, light - field count technique.

3) Both concentration and per cent quartz for the application of this limit are to be determined from the location passing a size - collector with the following characteristics:

Aerodynamic Diameter (μm)	% passing selector
2.2	90
2.5	75
3.5	50
5.0	25
10	0

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a) As sampled by method that does not collect vapors.

b) According to analytically determined composition.

c) For control of general room air, biologic monitoring is essential for personnel control.

+ 1968 Revision
++ 1968 Addition

+ 1968 Revision
++ 1968 Addition

exceeds unity, then the threshold limit of the mixture should be considered as being exceeded. C_1 indicates the observed atmospheric concentration, and T_1 the corresponding threshold limit. (See Example 1A.a.)

Exceptions to the above rule may be made when there is good reason to believe that the chief effects of the different harmful mixtures are not in fact additive, but independent as when purely local effects on different organs of the body are produced by the various components of the mixture. In such cases the threshold limit ordinarily is exceeded only when at least one member of the series (C_1/T_1 , C_2/T_2 , etc.) itself has a value exceeding unity. (See Example 1A.b)

Antagonistic action or potentiation may occur with some combinations of atmospheric contaminants. Such cases at present must be determined individually. Potentiating or antagonistic agents are not necessarily harmful by themselves. Potentiating effects of exposure to such agents by routes other than that of inhalation is also possible, e.g. inhibited alcohol and related narcotic (trichloroethylene). Potentiation is characteristically exhibited at high concentrations, less probably at low.

When a given operation or process characteristically emits a number of harmful dusts, fumes, vapors or gases, it will frequently be only feasible to attempt to evaluate the hazard by measurement of a single substance. In such cases the threshold limit used for this substance should be reduced by a suitable factor, the magnitude of which will depend on the number, toxicity and relative quantity of the other contaminants ordinarily present.

Examples of processes which are typically associated with two or more harmful atmospheric contaminants are welding, automobile repair, blasting, painting, lacquering, certain foundry operations, diesel exhausts, etc. (Example 2.)

THRESHOLD LIMIT VALUES FOR MIXTURES EXAMPLES

1A. General case, where air is analyzed for each component.

a. ADDITIVE EFFECTS

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} + \frac{C_3}{T_3} + \dots + \frac{C_n}{T_n} = 1$$

Air contains 5 ppm of carbon tetrachloride (TLV, 10), 20 ppm of ethylene dichloride (TLV, 50) and 10 ppm of ethylene dibromide (TLV, 25).

$$\frac{5}{10} + \frac{20}{50} + \frac{10}{25} = \frac{10}{50} = 1.3$$

Threshold limit is exceeded.

b. INDEPENDENT EFFECTS

Air contains 0.15 mg/m³ of lead (TLV, 0.2) and 6.7 mg/m³ of sulfuric acid (TLV, 1).

$$\frac{0.15}{0.20} = 0.75; \quad \frac{6.7}{1} = 6.7$$

Threshold limit is not exceeded.

1B. Special case when source of contaminant is a mixture and atmospheric composition is assumed similar to that of original material, i.e. vapor pressure of each component is the same at the observed temperature.

a. ADDITIVE EFFECTS, approximate solution.

1. A mixture of equal parts (1) trichloroethylene (TLV, 100), and (2) methyl chloroform (TLV, 350).

$$\frac{C_1}{T_1} + \frac{C_2}{T_2} = \frac{C_m}{T_m}$$

Solution applicable to "spot" solvent mixture usage, where all or nearly all, solvent evaporates.

$$C_1 = C_2 = \frac{1}{2} C_m$$

$$\frac{C_1}{100} + \frac{C_1}{350} = \frac{C_m}{T_m}$$

$$\frac{C_1}{100} + \frac{C_1}{350} = \frac{C_m}{T_m}$$

$$T_m = 700 \times \frac{2}{9} = 155 \text{ ppm}$$

1B.b. General Exact Solution for Mixtures of N Components With Additive Effects and Different Vapor Pressures.

$$(1) \frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = 1;$$

$$(2) C_1 + C_2 + \dots + C_n = T_1;$$

$$(2.1) \frac{C_1}{T_1} + \frac{C_2}{T_2} + \dots + \frac{C_n}{T_n} = 1.$$

By the Law of Partial Pressures,

$$(3) C_1 = ap_1.$$

And by Raoult's Law,

$$(4) p_1 = F_1 p_1^0.$$

Combine (3) and (4) to obtain

$$(5) C_1 = aF_1 p_1^0.$$

Combining (1), (2, 1) and (5), we obtain

$$(6) \frac{F_1 p_1^0}{T_1} + \frac{F_2 p_2^0}{T_2} + \dots + \frac{F_n p_n^0}{T_n} =$$

$$\frac{F_1 p_1^0}{T_1} + \frac{F_2 p_2^0}{T_2} + \dots + \frac{F_n p_n^0}{T_n}$$

and solving for T_1 ,

$$(6.1) T = \frac{F_1 p_1^0 + F_2 p_2^0 + \dots + F_n p_n^0}{\frac{F_1 p_1^0}{T_1} + \frac{F_2 p_2^0}{T_2} + \dots + \frac{F_n p_n^0}{T_n}}$$

$$\text{or } \sum_{i=1}^n F_i p_i^0 = F_1 p_1^0$$

$$(6.2) T = \frac{1}{\sum_{i=1}^n \frac{F_i p_i^0}{T_i}}$$

T = Threshold Limit Value in ppm.
 C = Vapor concentration in ppm.
 p = Vapor pressure of component in solution.

P^0 = Vapor pressure of pure component.
 F = Mol fraction of component in solution.
 a = A constant of proportionality.
 Subscripts 1, 2, ... n relate the above quantities to components 1, 2, ... n, respectively.
 Subscript i refers to an arbitrary component from 1 to n.
 Absence of subscript relates the quantity to the mixture.

Solution to be applied when there is a reservoir of the solvent mixture whose composition does not change appreciably by evaporation.

Exact Arithmetic Solution of Specific Mixtures

	Mol. wt.	Density	T, °C	Mol fraction in bulk and half-saturated vapor
Trichloroethylene (1)	131.4	1.46 g/ml	100	7.3mm Hg 0.527
Methylchloroform (2)	133.42	1.37 g/ml	350	17.3mm Hg 0.473

$$P_{10}^0 = (0.527)(73) = 38.5$$

$$P_{20}^0 = (0.473)(173) = 81.8$$

$$T = \frac{38.5 + 81.8}{1.17 + 0.527} = \frac{120.3}{1.70} = 70.8$$

$T = 177$ mm (Note difference in T.L.V. when account is taken of vapor pressure and mol fraction in comparison with above example where such account is not taken).

- A mixture of one part of (1) paraffin (T.L.V. 0.1) and two parts of (2) EPA (T.L.V. 0.5).

$$\frac{C_1}{0.1} + \frac{C_2}{0.5} = \frac{C_{mix}}{T_m} \quad C_2 = 2C_1$$

$$C_m = 3C_1$$

$$\frac{C_1}{0.1} + \frac{2C_1}{0.5} = \frac{3C_1}{T_m}$$

$$\frac{2C_1}{0.5} = \frac{2C_1}{T_m}$$

$$T_m = \frac{1}{\frac{1}{0.5}} = 0.21 \text{ mol/m}^3$$

T. L. V. for Mixtures of Mineral Dusts.

For mixtures of biologically active mineral dusts the general formula for mixtures may be used. With the exception of asbestos, pure minerals are assigned T.L.V. of 2.5, 20 or 50.

For a mixture containing 85% talc and 15% quartz, the T.L.V. for 100% of the mixture "C" is given by:

$$T.L.V. = \frac{1}{\frac{0.85}{2.5} + \frac{0.15}{50}} = 0.4 \text{ mg/m}^3$$

Essentially the same result will be obtained if the limit of the more (less) toxic component is used provided the effects are additive. In the above example the limit for 20% quartz is 10 mg/m³.

For another mixture of 25% quartz 25% amorphous silica and 50% talc:

$$T.L.V. = \frac{1}{\frac{0.25}{10} + \frac{0.25}{10} + \frac{0.5}{2.5}} = 1.3 \text{ mg/m}^3$$

The limit for 25% quartz approximately 8 mg/m³.

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Appendix C BASES FOR ASSIGNING LIMITING "C" VALUES

By definition in the Preface, a listed value bearing a "C" designation refers to "ceiling" value that should not be exceeded; all values should fluctuate below the listed value. In general the bases for assigning or not assigning a "C" value rest on whether excursions of concentration above a proposed limit for periods up to 15 minutes may result in a) intolerable irritation, b) chronic, or irreversible tissue change, or c) necrosis of sufficient degree to increase accident proneness, impair self rescue or materially reduce work efficiency.

In order for the Committee to decide whether a substance is a candidate for a "C" listing, some guidelines must be formulated on the permissiveness of the response in the categories a, b, c, given above. For this the factors given in the table below have been used by the Committee. For both technical and practical reasons, the factors have been pegged to the concentration in an inverse manner. It will be noted that as the magnitude of the T. L. V. increases a correspondingly decreased range of fluctuation is permitted; not to decrease the factor for T. L. V.'s of increasing magnitude would permit exposures to large absolute quantities, an undesirable condition, a condition that is minimized at low T. L. V.'s. Moreover, larger factors at the lower T. L. V.'s are consistent with the difficulties in analyzing and controlling trace quantities.

T.L.V. limit ppm or mg/m ³	Test T.L.V. Factor	Examples
0 to 1	3	Toluene disocyanate T. L. V. 0.02 ppm, if permitted to rise above 0.05 ppm may result in sensitization in a single subsequent exposure! "C" listing recommended on category b.
1 to 10	2	Manganese T.L.V., 5mg/m ³ , contains little or no safety factor. All values should fluctuate below 5mg/m ³ . "C" listing recommended on category b.

T.V.V. ppm ^a or mg/m ³	Test T.V.V. Factor	Examples
10 + to 100	1.5	Methyl styrene-T. L. V. 100 if encountered at levels of 150 ppm will prove intensely irritating. "C" listing recommended in category A.
100 + to 1000	1.25	Methyl chloroform-T. L. V. 350ppm, at 430 ppm for peri- ods not exceeding 15 min- utes is not expected to re- sult in untoward effects relating to category C. No "C" listing recommended.

Appendix E Some Simple Asphyxiants - "Inert" Gases and Vapors.

Acetylene	Hydrogen
Argon	Methane
Ethane	Neon
Ethylene	Nitrogen
Helium	Nitrous Oxide
	Propane

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Appendix D

Some "Inert" or Nuisance Particulates*

Aluminum (Al ₂ O ₃)	Limestone
Calcium carbonate	Magnetite
Cellulose	Marble
Portland Cement	Pentamethylol
Corundum (Al ₂ O ₃)	Plaster of Paris
Emery	Rouge
Glycaine Mist	Silicon Carbide
Graphite (Synthetic)	Starch
Gypsum	Sucrose
Vegetable oil mists	Tin Oxide
(except castor, cashew	Titanium Dioxide
nut, or similar irritant	
oils)	

*When toxic impurities are not present.

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Wayland J. Hayes, Jr., M.D.	Ralph G. Smith, Ph.D.
	Mitchell R. Zaven, M.D.

Herbert E. Stokinger, Ph.D., Chairman
William D. Wagner, Recording Sec'y

PERMISSIBLE EXCURSIONS FOR TIME-WEIGHTED AVERAGE (TWA) LIMITS

As stated in the preface, the same factors may be used as guides for reasonable excursions above the limit for substances to which the time-weighted average applies. The time-weighted average implies that each excursion above the limit is compensated by a comparable excursion below the limit. Thus, a value of 6 ppm MF is permissible for periods not exceeding 15 minutes, provided an equivalent decrease below the limit of 3 ppm obtains.

* Whichever unit is applicable

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INDUSTRIAL HYGIENE DIGEST
Literature and News

NEWS ITEMS

912 Asbestosis Classified on X-Ray Severity.

To clarify the "international problem" of asbestosis—a disease of the lungs found in asbestos workers—medical representatives from a number of countries are classifying the ailment on the basis of its severity as seen on x-rays. Dr. Benjamin Felson, director of the department of radiology at the University of Cincinnati Medical Center and a member of that group, has recently returned from a meeting in England with representatives of Great Britain, Canada, Germany, Finland, and South Africa. He is a consultant in occupational health to the U.S. Public Health Service. This is not a common disease viewed in relation to total population, but it is a major occupational hazard for insulation workers such as pipe fitters. Dr. Felson points out.

--Air Eng. 10, 13 (July, 1968)

913 Generic Drugs.

"The Food and Drug Administration (FDA) has in no sense concluded that generic drugs are less effective as a class than brand-name products," FDA Commissioner Herbert L. Ley said recently. "There are fewer than two dozen drugs where therapeutic differences among competing products may be a problem," he added. Dr. Ley's comments were made in response to a report recently on the studies of three drugs by Dr. Christopher M. Martin of Georgetown University, which questions the effectiveness of generic versions of drugs. "Data from the Georgetown work have been useful to FDA, but it is completely unwarranted to reach any general conclusions about drug equivalency on the basis of these exploratory studies," Dr. Ley said. Of the three drugs tested, only chloramphenicol showed a clinically significant difference in blood levels, the FDA commissioner pointed out.

--Chem. Eng. News 46 47 (Aug. 26, 1968)

914 Lithium Carbonate.

The usefulness of lithium carbonate in treating mania and preventing depression will be the subject of a systematic evaluation by a number of institutions under grants from the National Institute of Mental Health. If proven effective, lithium carbonate, an inexpensive white powder, will be an important weapon in the treatment of manic-depressive psychosis. This disorder affects many people and is present in a sizable proportion of the nation's 250,000 suicides each year.

--Chem. Eng. News 46, 57 (Aug. 26, 1968)

915 Dimethyl Sulfoxide.

The Food and Drug Administration (FDA) will soon relax its restrictions on dimethyl sulfoxide (DMSO), mainly by loosening the rigid prior approval once required for clinical use of the drug. The FDA banned clinical studies with DMSO in 1965. But in late 1966 the drug agency partially lifted the ban to allow clinical studies with the pulp-derived drug under guidelines set up to give patients maximum protection.

--Chem. Eng. News 46 47 (Aug. 26, 1968)

916 New Warning on Sniffing.

Du Pont is issuing its second strong warning in less than a year of the danger of intoxicating oneself by deliberately inhaling the concentrated vapors of aerosols and other products. Fourteen deaths have been reported this year as attributable to the practice. The Du Pont warning, issued

on behalf of U.S. makers of fluorocarbon propellants and refrigerants, is part of a wide effort to stop such misuse of the products. The so-called "sniffing" started last year with cocktail glass chillers and has spread since to other products. The specific cause of the deaths that have occurred has been difficult to establish. It is known, however, that sudden death may occur when the lungs are filled with concentrated vapors of solvents or propellants that contain little or no oxygen. The propellant used most in fluorocarbon-based aerosol spray cans is fluorocarbon 12 (dichlorodifluoromethane). Six companies in the U.S. now make the product.

--Chem. Eng. News 46, 102 (Aug. 26, 1968)

917 Sulfur Content of Coal.

Restrictions on the sulfur content of coal have drawn new fire from industry. The National Coal Policy Conference claims that the use of low-sulfur coal "leads to technical and economic problems which could result only in higher costs for electricity and impairment of the reliability of electric service." The Conference bases this claim on the findings of a new survey by National Economic Research Associates, which says that many boilers used to produce electricity are designed to burn high-sulfur-content coal. Substituting a different type of coal may cause serious problems with many of them, it says, and rebuilding boilers to accommodate low-sulfur coal is often too expensive. Also, it claims, substituting low-sulfur coal may "diminish the efficiency of various air pollution control devices, such as electrostatic precipitators, that already have been installed by utilities at great cost."

--Chem. Eng. News 46, 61 (Aug. 26, 1968)

918 Oil Companies to Combat Pollution.

Oil companies will spend about \$382 million this year to help clean up the nation's air and waterways, according to a new study by the American Petroleum Institute. This will represent a 6.7% increase over the \$358 million the industry spent last year. A breakdown of the 1968 estimate shows that \$223 million will go to water pollution control, the rest to cleaning up the air.

--Chem. Eng. News 46, 27 (Aug. 26, 1968)

919 Fire's Tragic Toll.

In the United States every day, fire takes this tragic, often needless, toll, according to National Fire Protection Association research: 33 lives; 1,527 homes; 20 schools; 9 churches; 13 hospitals and nursing homes; 130 stores; 123 industrial plants. Last year an estimated 12,200 lives were lost in fires in the U.S. About 6,500 of these deaths resulted from fires in one- and two-family houses. Approximately one-third of the victims of fires are children, and about one of every three children who die in fire is alone when fire breaks out.

--Clipsheet, Natl. Fire Protect. Assn

920 Radiation Victims Ask \$9 Million.

The two most severely "burned" victims in a dramatic and still-unexplained radiation mishap here last fall have sued the producer of the equipment involved for a total of \$9 million. Edmund I. Czwalga, 40, of Cheswick, Pa., has sued High Voltage Engineering Corp., a Massachusetts firm, for \$6 million damages in the accident, which the suit charges, cost him both hands and one leg. Jack P. McCandless, 32, of Natrona Heights, Pa., who, the suit says, suffered — along with Mr. Czwalga — "acute radiation syndrome," is suing for \$3 million for the accident Oct. 4. The two, both employees of Gulf Research and Development Co., Harmarville, Pa., charged in Federal Court that they absorbed damaging doses of gamma rays from a 3-million-volt Van de Graaf particle accelerator while at work. The two charge that the interlocking safety devices of the potentially dangerous machine all failed in some unexplained manner, thus permitting it to give off rays while registering "not operating." The accident received worldwide attention when the two and a third Gulf employee, William C. Zemla, 31, of Natrona Heights, Pa., — less seriously injured — were treated with elaborate precautions by a team of medical men from several states at West Penn Hospital. The suits charge that Mr. Czwalga and Mr. McCandless were rendered sterile and more susceptible to leukemia by their experience. Mr. Czwalga, who received a dosage that usually proves lethal, was saved

partly because his temporarily destroyed white-blood-cell, disease-immunity system was revitalized by blood transfusions from an identical twin brother. Although Mr. Zemla was out of the hospital by Nov. 9 and back at work by early February, the other two victims fared less well.

--Pittsburgh Press, Sept. 25, 1968

Editor's Note: The following abstract of an editorial in the New England Journal of Medicine 279, 714 (Sept. 26, 1968) will be of interest to Industrial Hygiene Digest readers: "Radiation must be accepted as a tumorigenic agent in man. Skin cancer, which followed radiation-induced dermatitis and ulceration, made martyrs of early roentgenologists. Osteosarcomas and carcinoma of the paranasal sinuses resulted from ingestion of mesothorium by many radium watch-dial painters. Hundreds of these workers are still being studied to ascertain other late effects from this unique radiation exposure. Thyroid tumors, including cancer, have been found in people exposed to fallout and atomic-bomb radiation. Furth and Furth¹ in 1936 demonstrated a high incidence of leukemia in mice after exposure to radiation. Accordingly, a systematic search was made for leukemia in the Japanese atomic-bomb victims, and indeed it was found — the incidence being proportional to the dose of radiation above 100 rads. Several studies in mice and rats have shown that radiation produces diverse mammary tumors after single doses and protracted exposure. The response in rats is linear between 25 and 400 rads.² The yield of tumors was suppressed by ovariectomy. Irradiation of mammary tissue alone or in vitro with autotransplantation was sufficient to induce tumors.³ MacKenzie⁴ suggested that the incidence of mammary tumor was increased by extensive fluoroscopy. Mettler et al.⁵ have retrospectively followed women who had received radiotherapy to a single breast for mastitis. Tumors appeared in higher incidence in the irradiated than in the nonirradiated breast. Now, in this issue of the Journal, Wanebo et al.⁶ report that the incidence of tumors in the breasts of the females exposed to atomic-bomb radiation at Hiroshima and Nagasaki is increased and, in contrast to nonexposed women, occurs in the premenopausal period. The association between radiation exposure and breast tumors in women has now been suggested in three studies. Though still tenuous, this association demands continuing critical study...." Those interested should also see "Acute Radiation Syndrome" a new IHF Medical Bulletin No. 14-68

--R. T. P. deT.

1. Furth, J., and Furth, O. B. Neoplastic diseases produced in mice by general irradiation with x-rays. *Am. J. Cancer* 28, 54-65, 1936.
2. Bond, V. P., Cronkite, E. P., Lippincott, S. W., and Shellabarger, C. J. Studies on radiation-induced mammary gland neoplasia in rat, III. Relation of neoplastic response to dose of total-body radiation. *Radiation Research* 12, 276-285, 1960.
3. Shellabarger, C. J., and Schmidt, R. W. Mammary neoplasia following in vitro x-irradiation of mammary tissue. *Nature (London)* 218, 192, 1968.
4. MacKenzie, I. Breast cancer following multiple fluoroscopies. *Brit. J. Cancer* 19, 1-8, 1965.
5. Mettler, F. A., Jr., et al. Breast neoplasms in women treated with x-ray for post-partum mastitis: preliminary report. Submitted for publication.
6. Wanebo, C. K., Johnson, K. G., Sato, K., and Thorslund, T. W. Breast Cancer After Exposure to the Atomic Bombings of Hiroshima and Nagasaki. *N. Engl. J. Med.* 279, 667-671, Sept., 1968.

COMING EVENTS

- 921 Nov. 1-4 Association of American Medical Colleges, Houston, Tex.
 Nov. 4-7 American Institute of Ultrasonics in Medicine, New Orleans, La.
 Nov. 6-8 Pittsburgh Diffraction Conference, 26th Annual, Mellon Institute, Pittsburgh, Pa.
 Nov. 6-9 Conference on Respiratory Therapy (Annual), Boston, Mass.
 Nov. 7-8 American Academy of Compensation Medicine, Meeting on Medical and Surgical Problems in Workmen's Compensation, New York, N. Y.
 Nov. 7-9 American Society of Cytology, Cleveland, Ohio.
 Nov. 7-10 Association of Clinical Scientists, Annual Meeting, Washington, D. C.
 Nov. 10-14 American School Health Association, Detroit, Mich.
 Nov. 10-15 American Association for Inhalation Therapy, Houston, Tex.
 Nov. 11-13 American Association for Clinical Immunology and Allergy, Las Vegas, Nev.
 Nov. 11-14 Interstate Postgraduate Medical Association of North America, Pittsburgh, Pa.
 Nov. 11-15 American Association of Public Health Physicians, Detroit, Mich.
 Nov. 11-15 American College of Preventive Medicine, Detroit, Mich.
 Nov. 11-15 American Public Health Association, Detroit, Mich.

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- Nov. 13-15 Parenteral Drug Association, Annual Convention, New York, N. Y.
- Nov. 15-18 American Speech and Hearing Association, Denver, Colo.
- Nov. 18-20 American Petroleum Institute, Annual Meeting, Chicago, Ill.
- Nov. 18-20 National Fire Protection Association, Fall Conference, Milwaukee, Wis.
- Nov. 18-21 Conference on Engineering in Medicine and Biology (21st Annual), Houston, Tex.
- Nov. 18-21 14th Conference on Magnetism and Magnetic Materials, New York, N. Y.
- Nov. 18-21 Symposium on Basic Mechanisms of the Epilepsies, Colorado Springs, Colo.
- Nov. 19 Air Pollution Control Conference, University of Missouri, Columbia, Mo.
- Nov. 19-20 Council on Atherosclerosis (American Heart Assn.), Bal Harbour, Fla.
- Nov. 20-22 Aluminum Association, Fall Meeting, New York, N. Y.
- Nov. 20-22 National Society for the Prevention of Blindness, Inc. (Annual Conference), New York, N. Y.
- Nov. 21-26 American Heart Association, Bal Harbour, Fla.
- Nov. 22 Industrial Hygiene Foundation, Fibrous Dust Seminar, Mellon Institute, Pittsburgh, Pa.
- Nov. 26 Manufacturing Chemists Association, Semiannual Meeting, New York, N. Y.
- Nov. 30 AMA National Conference on Community Health Planning, Miami Beach, Fla.

LEGAL DEVELOPMENTS

922 Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking.

Notice of proposed rule making is made pursuant to Section 41 of the Longshoremen's and Harbor Workers' Compensation Act (33 U.S.C. 941) to amend 29 CFR, Parts 1501, 1502, and 1503. The changes are proposed in view of the need to delineate the information to be obtained by the employer in order to meet the requirements of these parts. Written data, views, or argument regarding the proposal may be filed by mail with the Director, Bureau of Labor Standards, U. S. Department of Labor, 400 First Street N.W., Washington, D. C. 20210, within 60 days after this document is published in the Federal Register. In 29 CFR 1501.57, paragraph (d) would be revised to read as follows: 1501.57 Health and sanitation. (d) The information which must be ascertained under paragraph (a) of this section includes information on all of the items listed below which are applicable to the specific product or material: (1) Manufacturer's name, address, and telephone number. (2) Chemical name and synonyms, trade name, chemical family, formula, and general description of single chemical, mixture of chemicals, or basic structural or process material. (3) Chemical names of ingredients, such as but not limited to those of mixtures, such as paints and preservatives, of alloys, filler metals, and welding rods, of platings, and of abrasive blasting materials. (4) Physical data, including Boiling Point, in degrees Fahrenheit; Vapor Pressure, in millimeters of mercury; Reid Vapor Pressure, in pounds per square inch absolute; Vapor Density of gas or vapor (air-1); Freezing Point, in degrees Fahrenheit; Solubility in water, in percent by weight; Specific Gravity of liquid (water-1); Percentage Volatile, by volume; and Evaporation Rate for liquids (ether-1). (5) Fire and explosion hazard data, including Flash Point, in degrees Fahrenheit; Autoignition Temperature, in degrees Fahrenheit; Flammable Limits, in percent by volume in air; Suitable extinguishing media or agents; Special fire fighting procedures; and Unusual fire hazards. (6) Health hazard data, including Threshold Limit Values, in millions of particles per cubic foot of air for dust, in milligrams of particulate per cubic meter of air for fumes, and in parts per million parts of air by volume for gases and vapors; Odor Threshold, in parts per million parts of air by volume; Toxic characteristics; Signs of poisoning; Short Exposure Tolerance, in parts per million parts of air by volume; and First aid exposure procedures. (7) Reactivity data, including Stability; Compatibility; Decomposition products; and Polymerization rate. (8) Spill or leak procedures and precautions. (9) Special precautions recommended, including respiratory protection; ventilation, such as local exhaust, mechanical, special, or other; personal protective equipment, including protective gloves, eye protection, and protective clothing. (10) Handling and storage precautions. The required information shall be entered on U.S. Department of Labor Form LSB OOS-4, "Hazardous Material Data Sheet," or on an essentially similar form accepted by the Bureau of Labor Standards. The completed form shall be kept on file, available for inspection, for a period of at least 3 months from the date of the completion of the job. Similar changes are noted for Paragraphs 1502.57 and 1503.57. (F.R. Doc. 68-10156; Filed Aug. 22, 1968; 8:45 a.m.) --Federal Register, 33, No. 165, Aug. 23, 1968

Editor's Note: At the suggestion of the Foundation's Chemical-Toxicological and Legal Committees and with the approval of the Foundation's Board of Trustees at its October 14 meeting, request has been made by Industrial Hygiene Foundation to appear and offer technical advice if hearings are held.

--R. T. P. deT.

923 Labor Secretary Proposes Stronger Health and Safety Standards Under Walsh-Healey Act.

Secretary of Labor Willard Wirtz today proposed revisions which would strengthen the safety and health standards of the Walsh-Healey Public Contracts Act. This Act sets basic labor standards for work done on United States contracts over \$10,000 in value. The proposed safety and health revisions would: (1) Limit the level of occupational noise to 85 decibels, establishing the first Federal occupational noise regulation. (2) Make acceptable under the Act safety and health standards developed under the consensus principle by nationally recognized standard-setting agencies, such as the United States of America Standards Institute. (3) Adopt radiation standards developed by the Atomic Energy Commission. (4) Adopt certain safety and health standards developed by the Compressed Gas Association, the National Committee on Traffic Safety, and the American Conference of Governmental Industrial Hygienists. (5) Establish threshold limits for exposure to toxic materials. If adopted, the proposed standards will revise those issued in December, 1960. These standards codified safety and health requirements under the Walsh-Healey Act for the first time. The proposed revisions incorporate recommendations offered at public hearings and at meetings with industry and labor. Complete text of the proposed revisions will be published in the Federal Register on September 20, and a public hearing on the proposals will be held at the Labor Department in Washington beginning November 6.

--U.S. Dept. of Labor News Release, Sept. 20, 1968

Editor's Note: Regarding the above news release, the following information contained in a letter from George D. Clayton, Executive Secretary, American Industrial Hygiene Association (AIHA), dated October 3, 1968, will be of interest: "Dr. Van Atta called today and pointed out two omissions in the regulations proposed by the Bureau of Labor, as printed in the Federal Register dated September 20, 1968. These are: (1) Words underlined were omitted in the following statement: The proposed noise level is 85 decibels on the A Scale slow response. (2) Entire statement should be added to the tail end of Paragraph A. 'If the noise levels cannot be restricted within the maximum professional level by such methods, employees' hearing shall be safeguarded by adequate, professional, protective equipment.'" Reportedly, the National Safety Council and the AIHA are prepared to offer testimony at the November 6 hearings. The complete text of the above reference is on file at IHF headquarters and may be made available to IHF members on request.

--R. T. P. deT.

BOOKS, PAMPHLETS, AND NOTICES

924 Publications From East Germany.

Arbeitshygienische Information Bauwesen, Vol. 4, Nos. 1, 2 and 3 (1968).
 Arbeitshygienische Information, No. 5 (1966) and No. 8 (1967).
 Arbeitshygiene und Arbeitsschutz im Bauwesen (1966).
 Ergonomie Arbeits- und Gesundheitsschutz Bau, No. 1 (1967).
 Jahresbericht (1967).

All periodicals available from VEB Verlag für Bauwesen, 108 Berlin, Französische Strasse, DDR, Germany.

Subjects covered in the above listed publications include: occupational medicine, occupational hygiene, occupational physiology, occupational psychology, construction hygiene, prophylaxis and rehabilitation, geriatrics, noise problems in industry, lighting problems, and first aid. Reports from the surgical and accident, women's, dermatitis, throat-nose-ear, eye, stomatology, x-ray and physiotherapy divisions are included, as well as material on legal aspects, publications, lectures, etc.

--J. Metschl

Editor's Note: The above publications have been received from H. G. Haublein, M.D., who is in charge of occupational medicine in East Germany. His annual report for 1967 was enclosed in correspondence, which is translated as follows (translated by J. Metschl), dated August 6, 1968: "We note with interest the recent publication of your 'Industrial Hygiene Highlights' and request a free copy in order to bring this work to the attention of our readers concerned with industrial hygiene in the construction industry. We would like to receive further material in the field of occupational health and safety. We enclose some of our material related to the

above fields. With greatest respect, (signed) Direktor: OMR Dr. H. G. Haublein, Deutsche Demokratische Republik, 102 Berlin, Magazinstrasse 6-7, Germany. These publications, which are written entirely in German (without multilingual summary), apparently are straightforward and not political in nature. Digest readers interested in industrial hygiene practices in East Germany may find in such publications a source of useful information not otherwise easily available. IHF review copies will be retained temporarily to determine if there should be interest on the part of the Foundation's membership in industrial hygiene practices and problems in East Germany.

--R. T. P. deT

INDUSTRIAL MEDICAL PRACTICE

- 925 Crisis in Our Time. E. G. Dimond. Arch. Internal Med. 21, 171-178 (Aug., 1968).

The physician deals with individuals one at a time. It is natural for him to consider group plans or undertakings as alien to his and his patient's welfare. Yet medicine is a public service function and the present social revolution is involving medicine, whether or not the physician desires it. Recent medical organizational and legislative events relate to concepts of comprehensive medicine and the personal physician. Health arguments based on substantial differences are shaping the future of physicians and practice.

--J. Am. Med. Assn. References & Reviews

- 926 To Meet the Nation's Health Needs. (1968 Shattuck Lecture to the Massachusetts Medical Society, Boston). R. Q. Marston. New Engl. J. Med. 279, 520-524 (Sept. 5, 1968).

Physicians tend to have trouble with this widespread public clamor about the best medical care for all. On the one hand, many believe it implies undue criticism of the medical profession itself, because each doctor as an individual has accepted the best in care as a personal mandate throughout his career. Secondly, it is seen as a promise that cannot be fulfilled, not only because of the limitations of resources and mechanisms but also because the consumer himself has a dominant role in defining "the best of medical care" — a role we cannot and perhaps should not control. Thomas Jefferson, in June, 1776, in drafting the Declaration of Independence, emphasized that he was giving expression to widely held views when he wrote: "We hold these truths to be self-evident..." It is also self-evident that the medical profession is deeply committed to meeting the health needs of the nation and that although we face a time of unparalleled challenge we also face a time of unparalleled opportunity. This, if you will, is a kind of declaration of interdependence. There are high hopes throughout the world that we in this country can demonstrate the same types of accomplishments in health care that we have demonstrated in other areas, such as biomedical research. These hopes and the expectations of our own society are so high indeed that we must face realistically the possibility that the many challenges may exceed our combined ability to meet all of them as we should like to. There has never been a greater opportunity for all to work together for the achievement of truly important health goals.

--Cond. from text

- 927 Characteristics of Drug Abusers Admitted to a Psychiatric Hospital. L. J. Hekimian and S. Gershon. J. Am. Med. Assn. 205, 125-130 (July 15, 1968).

One hundred and twelve drug abusers admitted to Bellevue Psychiatric Hospital were studied from a social, motivational, psychiatric, and pharmacological view. Heroin users were usually sociopathic and were costing the city \$10 million a day in crimes to support their habit. Emotionally disturbed but younger groups tended to use marijuana, amphetamines, and hallucinogens. Fifty percent of this group were considered to be schizophrenic before taking drugs and 37% required state hospitalization. Thus, protracted psychotic states thought to be due to drug ingestion may be due to preexisting mental disturbances. A desire for euphoria, possibly stemming from underlying depression, was most frequently the reason given for drug abuse. Influences by friends or environment was the second most frequent reason. Almost all patients had experience with drugs other than the one which caused admission to the hospital. There are 14 references.

--Authors' abstr.

Editor's Note: Dr. Marston (Abstract No. 926), new head of National Institutes for Health, will find the Industrial Hygiene Foundation's Mental Health Study of interest. Utilization of existing health resources in industry, recently estimated to cost 1/3 billion dollars per year, to improve health support of employees will benefit the entire community.

--R. T. P. deT.

- 928 Annual Review: The Lens and Vitreous. H. M. Freeman.
Arch. Ophthalmol. 80, 132-144 (July, 1968).

Approximately 400 articles pertaining to the lens and vitreous were reviewed. Publications dealing with biochemistry and physiology of the lens will be dealt with in the annual review of "Biochemistry and Physiology of the Eye." During the past year, there has been an awakening of clinical interest in the vitreous. Improvements in instrumentation and techniques of examination of the vitreous cavity have led to a more accurate interpretation of vitreous findings and have accelerated developments in the promising field of vitreous surgery. Therefore, a relative emphasis has been placed on the vitreous in this annual review.

--J. Am. Med. Assn. References & Reviews

- 929 Reading Aids for the Partially Sighted. L. L. Sloan.
Arch. Ophthalmol. 80, 35-38 (July, 1968).

A successful reading aid is defined as one which the patient uses to read books, magazines or newspapers for at least 15 minutes at a time. The aid is considered a partial success if the reading time is less or if only larger print can be read. A low incidence of failure was found in 513 unselected patients. Occasional failures were associated with a changing level of visual impairment or a very small usable field of vision. The most important factor is the degree of magnification required for easy reading. This determines the power and type of aid that is acceptable. Age is also important because it affects motivation and ability to learn a new way of reading. Even in patients with the worst prognosis, i.e., those over 70 who required high magnification, 48% were helped by a reading aid.

--J. Am. Med. Assn. References & Reviews

- 930 Chronic Nonspecific Respiratory Disease in a Movie Projectionists Union. Boston, 1963-1964. B. G. Ferris, Jr., W. A. Burgess, and Jane Worcester. Arch. Environmental Health 16, 886-891 (June, 1968). (See also Industrial Hygiene Digest Abstract No. 955 for October, 1967).

A survey of 166 members (96% of those available) of a movie projectionists union in the Boston area did not reveal significant differences in respiratory symptoms of pulmonary function between those who had entered the union prior to 1940 and those who had entered the union after 1940. Measurements included responses to a standard questionnaire, and simple tests of pulmonary function. Cigarette-smoking habits were taken into account. Aerometric measurements were made in the booths and were much lower than those reported in the literature prior to 1940. As a result of this morbidity survey we do not believe that these movie projectionists have had significant exposures at work. There are 7 references.

--Authors' abstr.

- 931 Oxygen Concentration in Tents and Incubators in Paediatric Practice. H. Simpson and D. J. Russell. Brit. Med. J., No. 5573, 201-204 (Oct. 28, 1967).

The oxygen concentrations attained in tents and incubators during routine pediatric use are reported. An oxygen concentration of 10 to 60 per cent is most readily attained in the Oxygenaire Humidaire Tent, the most efficient of the tents tested. Accurately controlled oxygen therapy in the range of 24 to 35 per cent is attainable in the Venturi Head Tent, which may find a place in pediatric oxygen therapy. Incubators in neonatal use generally fulfill their manufacturers' specifications.

--Am. Rev. Resp. Dis. Abstr.

- 932 Demineralization of the Dorsum Sellae Associated With Alcoholism. M. Albert and M. LeMay. Brit. J. Radiol. 41, 331 (1968).

Five normotensive patients were found with striking localized demineralization of the dorsum sellae. Their ages ranged from 35 to 51 years. The changes were indistinguishable from those seen with increased intracranial pressure. All five patients were chronic alcoholics and none had evidence of raised intracranial pressure. The authors postulate that this finding may reflect early nutritional osteoporosis.

--Can. Med. Assn. J. Abstr.

- 933 Short Term Treatment of Acute Bursitis of the Shoulder. A Double-Blind Study of the Use of Indomethacin and Placebo. A. Cohen and R. W. Cohen.
Penna. Med. 71, 66-70 (Sept., 1968).

Thirty-six men and women with moderate to very severe bursitis of the shoulder were treated for one week with either indomethacin or placebo (25 mg. capsules q. 6h.) in a double-blind trial. Response of the nineteen patients who took indomethacin was Fair to Good (3.8 on a 5-point scale). Response of the seventeen who took placebo was None to Fair (2.9 on the scale). The difference in response between the two groups was statistically significant. Side effects occurred in two patients, viz., diarrhea of short duration in one who took indomethacin and nausea controlled with antacid in one who took placebo. There are 5 references.

--Authors' summary

- 934 Brucella abortus in Fresh Cream and Cream Products. G. I. Barrow, et al.
Brit. Med. J. 2 596-600 (June 8, 1968).

Brucella abortus was isolated in two separate episodes from whipped cream from four of seven fresh cream cakes. The subsequent investigations at the bakeries and dairies concerned 19 isolations of B abortus from various samples of cream. Both of these episodes were due to insufficient heat treatment of the cream at the dairies. In the survey B abortus was also isolated by direct culture from five of 916 samples of clotted cream. This was presumably due to either survival of these organisms during heat treatment, or to contamination after heat treatment. Closer attention should be paid to cream as a hazard to public health, and the need for the introduction of minimum bacteriological standards for cream is emphasized.

--J. Am. Med. Assn. References & Reviews

- 935 Cytoplasmic Activity in Type I Pulmonary Epithelial Cells Induced by Macroaggregated Albumin. Edith J. Hapke and H. J. Pederson. Science 161, 580-582 (Aug. 2, 1968).

After the intravenous injection of radioalbumin macroaggregate, large numbers of cytoplasmic inclusion bodies were observed in the lung tissue of rats. The inclusions were located mainly in the cytoplasm of type I alveolar lining cells, appeared 40 minutes after the injection, and lasted up to 2 days. These observations suggest that the type I alveolar lining cells participate in the clearing mechanism of the lung tissue, a function that thus far has not been attributed to this type of cell. There are 3 references.

--Authors' abst.

- 936 Natural History of Tuberculosis in Human Body. J. A. Myers, J. E. Bearman, and A. C. Botkins. Diseases of Chest 53, 687-699 (June, 1968).

Of 3,192 graduates of three private hospital schools of nursing, 91.9% were traced. The 68 who died for non-tuberculous conditions and the 289 who were not located were followed medically for 1,374 and 8,734 person-years respectively before death or at the time of last contact. When prophylactic measures were well under way (including tuberculin testing) only eight converters were found in all three schools. Among the 1,323 students who reacted to tuberculin on admission, or converted while in school or after graduation, 35 (2.6%) subsequently developed clinical pulmonary lesions, one had renal disease, and ten pleurisy with effusion. No student developed tuberculous meningitis or miliary dissemination. Among the 14 who converted while in school, 11 did so before 1935, two in 1943, and one in 1944.

--J. Am. Med. Assn. References & Reviews

- 937 Pulmonary Complications and Water Retention in Prolonged Mechanical Ventilation. A. Sladen, M. B. Laver, and H. Pontoppidan. New Engl. J. Med. 279, 448-453 (Aug. 29, 1968).

In a retrospective study of 100 patients treated with prolonged mechanical ventilation, water retention without evidence of cardiac failure developed in 19. This was associated with radiologic evidence of pulmonary edema and with the following significant changes: a mean gain in weight of 2.6 kg; a mean increase in the alveolar-arterial oxygen tension gradient of 127 mm of mercury; a decrease in vital capacity of 29 per cent; a reduction in estimated compliance

of 31 per cent; a fall in hematocrit of 13 per cent; and a decrease in serum sodium of 5.80 mEq per liter. These changes were reversed after the institution of a negative water balance by restriction of water intake and by diuretic therapy. Radiologic improvement was usually prompt. The appearance of pulmonary edema may be related to a relative water overload, a rise in antidiuretic hormone production or subclinical cardiac failure. There are 24 references.

--Authors' abstr.

- 938 Occupation, Education, and Coronary Heart Disease. L. E. Hinkle, Jr., et al. *Science* 161, 238-246 (July 19, 1968).

A 5-year prospective survey of the relation between occupation, education, and coronary heart disease has been carried out among the 270,000 men employed by the Bell System throughout the continental United States. The findings indicate that men who attain the highest levels of management as a group do not have a higher risk of coronary heart disease than men who remain at lower levels. The findings provide no evidence that men who have high levels of responsibility, or who have been promoted rapidly, frequently, or recently, or men who are transferred to new departments or to new companies, have any added risk of coronary heart disease. On the other hand, men who enter the organization with a college degree have a lower attack rate, death rate, and disability rate for coronary heart disease at every age, in every part of the country, and in all departments of the organization. The difference in risk appears to exist at the time the men are hired and apparently is not greatly changed by any of the subsequent experiences of the men. We have discussed some of the reasons for believing that this difference in risk is not a result of the educational process itself, but is the result of biological differences between the college and no-college men which are related to, but not necessarily the result of, the differences in social and economic backgrounds from which they originated; some of these differences seem to take the form of habits of eating and smoking, which are formed in childhood and youth and persist during adult life. There are 30 references.

--Authors' summary

- 939 Licorice and Hypertension. R. E. LeFebvre and J. Marc-Aurele. *Can. Med. Assn. J.* 99, 230-231 (Aug. 3, 1968).

This case concerns a 34-year-old woman. In April, 1966, she was hospitalized for a dilatation and curettage following a spontaneous abortion. On admission, her blood pressure was noted to be 170/100. Because the blood pressure remained elevated, a full renal and hypertensive investigation was undertaken. All investigated parameters were found to be normal. About one week after her admission the blood pressure spontaneously returned to normal and she was discharged. Convinced that her symptoms and hypertension were emotional in origin, the patient returned to her occupation of nursing. While working in a postoperative recovery room, she would have her blood pressure taken regularly and noted it to be consistently elevated between 200/100 and 240/140. Disturbed by this persistent high blood pressure she consulted the authors. During questioning, the patient volunteered the information that she had developed a peculiar habit — that it was not unusual for her to eat at least two pounds of fresh licorice a week. Physical examination at this time revealed only an elevated blood pressure of 220/115, and there were no signs of neuromuscular disturbance. In ensuing days, the patient on her own accord decided to stop eating licorice. She continued to have her blood pressure taken regularly at work, and within a week it had dropped to 140/90. Since giving up the habit her blood pressure has remained within normal limits between 110/70 and 140/90. The patient admitted that while in the hospital in April, 1966, she had not eaten any licorice. The effect of the crude extract of the root of *glycyrrhisaglabra*, better known as licorice, upon the human system is discussed in detail. There are 10 references.

--Cond. from text

- 940 Licorice-Induced Pseudoaldosteronism, Hypertension, Hypokalemia, Aldosteronopenia, and Suppressed Plasma Renin Activity. J. W. Conn, D. R. Rovner, and E. L. Cohen. *J. Am. Med. Assn.* 205, 492-496 (Aug. 12, 1968).

Hypertension, initially normokalemic, was eventually associated with hypokalemia, alkalosis, suppressed plasma renin activity, and aldosteronopenia in a 58-year-old man who had ingested two to three 36-gm licorice candy bars daily for six years to seven years. Metabolic balance

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studies recorded complete recovery upon cessation of licorice ingestion. The syndrome was reproduced experimentally by oral administration of ammonium glycyrrhizate, the compound in licorice responsible for sodium retention. In categorizing mechanisms of hypertension, it is important to assess the functional state of the renin-aldosterone system by measuring both factors. When both yield low values it is likely that a potent sodium-retaining substance, other than aldosterone, either of endogenous or of exogenous origin, is at work. Licorice-induced hypertension serves a model of hypertensive disease developing as the result of ingestion of a foodstuff possessing sodium retaining activity. There are 15 references. --Authors' abstr.

- 941 Coronary Atherosclerosis in Persons Dying Violently. B. Viel, S. Donoso, and D. Salcedo. Arch. Internal Med. 21, 97-103 (Aug., 1968).

Autopsies on 1,150 men and 290 women following violent death were analysed to clarify etiology of atherosclerotic lesions. Soft lesions were noted in coronary arteries in persons less than ten years of age and increasingly to age 30, without significant differences between sexes. Hard lesions with more accelerated growth appeared later in life; women between ages 20 and 45 had a significantly lesser amount than men. The left anterior descending coronary artery was most affected by atherosclerosis among men over age 35. High socioeconomic status, obesity, and intellectual work showed a significant association with hard atherosclerotic lesions. Neither alcohol nor smoking seemed related to atherosclerosis.

--J. Am. Med. Assn. References & Reviews

- 942 Diabetes Mellitus in Old Age. A. Harth. Geriatrics 23, 138-145 (June, 1968).

In a follow-up study of 70 elderly diabetic patients residing in an Israeli geriatric home during a three-year period there were no serious cases of acidosis, and the classic complications of diabetes were not prevalent. There was no direct relationship between damage to the blood vessels, nerves, or retinas and the severity of disturbance in carbohydrate metabolism. Most of the patients in this group reacted positively to chlorpropamide treatment, without any side effect. The author feels that strict diet for elderly patients is not important and the outlook for aged diabetic patients appears to be quite favorable. Perhaps the present criteria used in diagnosis of diabetes in old age should be revised.

--J. Am. Med. Assn. References & Reviews

- 943 Glycosuria and Diabetes Mellitus in Canadian Eskimos. O. Schaefer. Can. Med. Assn. J. 99, 201-206 (Aug. 3, 1968).

Of 3,716 Canadian Eskimos screened in recent surveys, 4.7% showed glycosuria, the incidence varying from 2.4% in coastal Eastern Arctic Eskimos to 10.7% in the Caribou Eskimos of the Central Arctic. No significant correlation could be demonstrated between glycosuria and levels of blood sugar, the latter being generally low. Males had a markedly higher incidence of glycosuria than females, and there was a consistent decline of the male to female ratio from the Eastern to the Central Arctic. A higher incidence among relatives appeared at least partly independent of diet. In contrast to the relatively high incidence of glycosuria, diabetes mellitus is still very rarely found in Canadian Eskimos. A review of the 15 patients in whom a diagnosis of diabetes had been made in the last 10 years revealed that the diagnosis had been correct in only two (one of these being secondary to acromegaly) and questionable in two others of a total of approximately 13,000 Eskimos. There are 23 references.

--Author's summary

- 944 Circulatory Effects of Nicotine Aerosol Inhalations and Cigarette Smoking in Man. A. Herxheimer, et al. Lancet 2, 754-755 (Oct. 7, 1967).

Five healthy volunteers, four men and one woman, took part in the present study. All subjects had been smoking 5 to 15 cigarettes per day for three years, and all inhaled. The subjects refrained from smoking during the two hours preceding the experiment. Experiments were separated by at least one day. A comparison was made between the effect of smoking a commercially available filter-tip cigarette and a filter-tip cigarette made from cured lettuce leaves that contained no nicotine and the effect of inhaling an aerosol containing 53 mg of nicotine per metered

puff from a specially prepared "Medihaler" and a control aerosol containing only the propellant. Inhalation of smoke from the filter-tip cigarette and of nicotine aerosol in approximately equivalent amounts produced a similar increase in pulse rate and blood pressure. Inhalation from the nicotine-free cigarettes and from the aerosol propellant alone had no effect on the circulation.

--Am. Rev. Resp. Dis. Absts.

- 945 Lung Cancer and Bronchitis in Relation to Cigarette Smoking and Fuel Consumption in Twenty Countries. P. Stocks. Brit. J. Prev. Soc. Med. 21, 181-185 (Oct., 1967).

Male death rates from lung cancer and bronchitis in relation to consumption of cigarettes per adult older than 15 years and of solid and liquid fuel per capita were studied in 20 countries. The results suggest that although cigarette smoking is the most important factor in determining national death rates from lung cancer in men younger than 45, air pollution by coal smoke is as important as cigarette smoking in determining the death rates in those older than 55, and the two factors are sufficient to account for the rate variation in 17 countries; in the remaining three countries—Finland, Austria, and the Netherlands—additional unknown factors appear to be operating.

--Am. Rev. Resp. Dis. Absts.

- 946 The Role of Nicotine as a Determinant of Cigarette Smoking Frequency in Man With Observations of Certain Cardiovascular Effects Associated With the Tobacco Alkaloid. B. R. Lucchesi, C. R. Schuster, and G. S. Emley. Clin. Pharmacol. Ther. 8, 789-796 (Nov.-Dec., 1967).

The effect of intravenously administered nicotine on smoking behavior was studied in smokers who were unaware of the nature of the administered drug and the true purpose of the study. Smoking behavior was not altered significantly when nicotine was administered in a dose of 1 mg per hour for six hours. A significant decrease in smoking frequency was obtained when nicotine was administered at the rate of 2 to 4 mg per hour. Recordings of systolic blood pressure, heart rate, and electrocardiographic findings indicate that the physiologic alterations in these parameters produced by smoking can be reproduced by parenteral nicotine.

--Am. Rev. Resp. Dis. Absts.

- 947 Mouth Absorption of Various Compounds in Cigarette Smoke. T. Dalhamn, M.-L. Edfors, and R. Rylander. Arch. Environmental Health 16, 831-835 (June, 1968).

The absorption in the mouth of volatile and aerosol components in cigarette smoke was studied in humans. Determinations were made of acetaldehyde, isoprene, acetone, acetonitrile, toluene, and particulate matter using gaschromatography and fluorometric methods. The amount of the various compounds in smoke coming directly from the cigarette and smoke which had stayed in the mouth for two seconds were determined. The results were expressed as percent absorption. The absorption was higher for water-soluble compounds (around 60%) than for non-water-soluble compounds (around 20%). No correlation was found between boiling point and absorption. Sixteen percent of the particulate matter was retained in the mouth. A lower absorption was found among heavy smokers for isoprene, acetaldehyde, and acetonitrile. There are 9 references.

--Authors' abst.

- 948 Smoking Habits of Men Employed in Industry, and Mortality. G. Z. Brett and B. Benjamin. Brit. Med. J. 3, 82-85 (July 13, 1968).

In a prospective study the smoking habits of 54,460 male industrial workers aged 40 years and over were related to the deaths that had occurred in this population over a period of three years. Of 37,448 cigarette smokers, 14.4% retained the cigarette in the mouth between puffs ("drooping cigarette"); drooping increases in frequency with the amount smoked. The annual mortality rate from lung cancer was 0.3/1,000 for both nonsmokers and exsmokers and 1.2/1,000 for cigarette smokers, a ratio of 1:4. The highest mortality from lung cancer was observed in heavy smokers (2.4/1,000) and particularly in heavy smokers addicted to the drooping cigarette (4.1/1,000). There was an overall as well as an age-specific gradient of lung cancer mortality with amounts smoked. The mortality from coronary thrombosis in smokers was nearly three times that in nonsmokers. A mortality gradient with rising consumption of cigarettes was clearly defined. No correlation between smoking and mortality was found in other cardiovascular disease and cerebrovascular diseases.

--J. Am. Med. Assn. References & Reviews

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- 949 Value of Lung Cancer Detection by Six-Monthly Chest Radiographs. G. Z. Brett.
Thorax (London) 23, 414-420 (July, 1968).

Results are reported of a controlled prospective study carried out by the mass radiography service of the NW Metropolitan Region which evaluates early lung cancer detection by six-monthly x-ray examinations. The lung cancer experience of a test group of 29,723 men aged 40 and over who were offered six-monthly surveys during three years, is compared with a similarly constituted control group of 25,311 men who were x-rayed only at the beginning and the end of the study. Nearly 99% were followed up. The annual detection rate of lung cancer by six-monthly surveys was 0.9 per thousand, 65% of these cases were resected. In the test group as a whole, 43.6% of lung cancer was operable compared with 29% in the control, the difference ($P = 0.03$) being statistically significant. The annual mortality rate from lung cancer was 0.7 per thousand in the test and 0.8 in the control.

--J. Am. Med. Assn. References & Reviews

- 950 Cigarette Smoking During Pregnancy: The Effect Upon the Hematocrit and Acid-Base Balance of the Newborn Infant. M. K. Younoszai, A. Kacic, and J. C. Haworth.
Can. Med. Assn. J. 99, 197-200 (Aug. 3, 1968).

Clinical and laboratory findings were recorded for the first 48 hours of life in 16 infants whose mothers smoked 20 cigarettes or more a day throughout their pregnancies and were compared with the findings in 16 infants whose mothers were non-smokers. Both groups of infants were born at full term and were clinically healthy. The mean carbon monoxide saturation of hemoglobin in the venous blood of the cigarette-smoking mothers at the time of delivery was 8.3% and in the non-smoking mothers 1.2%. The corresponding mean umbilical cord vein blood levels were 7.3% and 0.7%. The blood pH, P_{CO_2} , bicarbonate and lactate values in both groups of infants were within the normal range for newborn infants. The infants of the cigarette-smoking mothers, however, showed a higher mean capillary blood hematocrit and a mild metabolic acidosis. Although these minor abnormalities did not appear to be of clinical significance in the group of infants studied, further investigation of infants of women who smoke during pregnancy might determine the cause of the increased incidence of low birth weight in these infants. There are 30 references.

--Authors' summary

- 951 Infiltrative Lung Diseases. P. P. VanArsdel, Jr., and R. Thune.
Yale J. Biol. Med. 40, 501-506 (April-June, 1968).

An increasing number of patients with infiltrative lung disease were found to be hypersensitive to organic dusts. The best known groups are farmers exposed to thermophilic molds, pigeon and parakeet fanciers, and sugar cane workers. The patients studied are pigeon-fanciers whose symptoms and pulmonary function abnormalities were reproduced by inhalation of dilute pigeon serum. The sera of these patients contained precipitating antibodies to pigeon serum, and skin reactions were characteristic of the Arthus phenomenon. There are as yet no good animal models; the various possibilities are reviewed with two main objectives in mind. The first is the identification of a similar disease produced by antigen inhalation, either naturally acquired or experimentally produced. The second is an attempt to produce disease by passive administration of human antibody followed by antigen challenge. This would test the hypothesis that this diagnostically important precipitating antibody is directly involved in the production of lung tissue damage.

--J. Am. Med. Assn. References & Reviews

- 952 Nasal Cancer in Woodworkers in Furniture Industry. E. D. Acheson, et al.
Brit. Med. J. 2, 587-595 (June 8, 1968).

The material reported shows beyond reasonable doubt that cabinetmakers, chairmakers, and wood machinists in the furniture industry in the southern part of the Oxford Hospital region are at special risk in respect to adenocarcinoma of the nasal cavity and sinuses, especially the ethmoid. The risk also extends to a significant but lesser extent to persons employed in other trades exposed to dust in the furniture industry. Carpenters and joiners, never employed in the furniture industry, either have no increased risk, or an increase in risk which is not detectable in a population of this size. The best estimates of the latent period of the tumor is 39 years, but tumors may develop after as little as five years' exposure in persons who have

left the industry. A constituent of wood dust which is inhaled and is present in such commonly used hardwoods as beech and oak is etiologically related to the development of these tumors. Polishes, lacquers, and varnishes are unlikely to be incriminated. The factor concerned was present as early as 1920 and at least as recently as 1940. It is likely that further cases will occur.

--J. Am. Med. Assn. References & Reviews

- 953 A Survey of Trichinosis Among Black Bears in Vermont. F. L. Babbott, Jr., and B. W. Day, Jr. Arch. Environmental Health 16, 900-902 (June, 1968).

Following the 1964 and 1965 hunting seasons, diaphragm and loin or rump specimens from 35 black bears shot in Vermont were examined for evidence of trichinosis. Laboratory studies included direct microscopy as well as digestion and concentration techniques. No larvae of Trichinella spiralis were found in this 11% sample of the annual bear kill. There are 12 references.

--Authors' abst.

- 954 Mite Infestations of Man Contracted From Dogs and Cats. L. R. Thomsett. Brit. Med. J. 3, 93-95 (July 13, 1968).

Acarine infestations of the dog and cat and their transmissibility to man are discussed. The relationship between age incidence in the host, duration of disease, and circumstances under which the animal is kept are stated. Of 65 human contacts at risk to 42 infected dogs and cats, 50 exhibited lesions of mite infestation. Of these lesions, 48% were confined to the arms and torso. Considering animal mite infestation in the differential diagnosis of human pruritis and papular skin disease is important.

--J. Am. Med. Assn. References & Reviews

- 955 Human Plague in the United States, 1900-1966. J. L. Caten and L. Kartman. J. Am. Med. Assn. 205, 333-336 (Aug. 5, 1968).

One or two cases of human plague occur on the average in the United States each year. The occurrence of seven cases in 1965 and five in 1966 led to this review of the available records. A total of 547 cases of human plague with 349 deaths was reported in the continental United States from 1900 to 1966. Epidemics, following epizootics in urban rats, account for 432 of the cases with 284 deaths, all prior to 1925. From 1908 to 1966, contact with wild-rodent sources caused an additional 115 cases with 65 deaths. There are 14 references.

--Authors' abst.

- 956 Toxicology in the Emergency Room. S. Schots. Penna. Med. 71, 51-52 (Sept., 1968).

The treatment of the poisoning victim regardless of the mode involves four disciplines. It is important that these disciplines be taken up in the following order: (1) The care of the respiratory and circulatory systems. (2) The possible evaluation of poisons which may still be lodged in the stomach. (3) Measures for hastening the elimination of the poisons. (4) Measures for neutralizing the effect of the poisons already absorbed—if this is practical. In any case of serious proportions, a plastic needle or catheter should be rapidly inserted into the most readily accessible vein and kept open with a suitable intravenous solution. This acts as an avenue for administering whatever is needed in fluid therapy as well as corrective drug therapy. An endotracheal tube with an inflatable cuff inserted prior to passing the stomach tube may be necessary to protect the patient from vomiting and aspirating stomach contents. Substances such as central nervous system depressants which exert their effect in proportion to their concentration in the blood can be removed by vigorous diuresis. As much as 600 cc of fluid may be given per hour as long as the urine volume is within 1,200 cc of the intravenous intake per day. Substances such as acetylsalicylic acid which in overdose can produce severe acidosis have to be treated by the giving of suitable amounts of a buffering alkali. The only adequate method of handling is the frequent analysis of the arterial blood to assess the patient's needs. Such determinations on anaerobically drawn arterial blood are much preferable to the more commonly performed carbon dioxide combining power.

--Cond. from text

- 957 Pulmonary Emphysema and Cigarette Smoke. Experimental Induction and Use of Bronchodilators in Rats. H. Ito and D. M. Aviado. Arch. Environmental Health 16, 865-870 (June, 1968).

Rats exposed to cigarette smoke daily for ten weeks did not develop signs of pulmonary emphysema. The rats subjected to experimental ligation of the trachea and intratracheal injection of papain developed signs of pulmonary emphysema but exposure to cigarette smoke did not uniformly influence the various signs. Functional residual capacity was not markedly elevated although histological examination showed a higher percentage of air spaces in emphysematous rats exposed to cigarette smoke. Cigarette smoke caused an increase in pulmonary resistance only in the rats with experimental emphysema. The increase in resistance is interpreted to mean an increase in broncho-motor tone. Isoproterenol injection induces bronchodilatation, more intensely in rats exposed to cigarette smoke. There are 11 references.

--Authors' summary

- 958 Densitometric Analysis of Normal and Emphysematous Lung Tissue. S. C. Glauser and Elinor M. Glauser. Arch. Environmental Health 16, 862-864 (June, 1968).

As emphysema is a disease entity which is characterized by overinflated alveoli and thin fragmented alveolar walls undergoing destructive change, it was decided to test the postulate that emphysematous lung tissue prepared by normal histological techniques is less optically dense than normal lung tissue. Slides of thin sections of lung tissue were placed on the stage of a photoelectric densitometer. This stage was driven at a constant rate so that the entire width of lung tissue was scanned and the optical density and integrated optical density recorded. Average optical density for normal piglet lung sections was found to be 3.87, while average optical density for emphysematous piglet lung sections was found to be 2.94. This difference is statistically significant. Hence photoelectric densitometry of lung sections will distinguish between normal and emphysematous lung sections. There are 10 references.

--Authors' abet.

- 959 Annual Cycle in Ventilatory Capacity of Men With Pneumoconiosis and of Normal Subjects. C. B. McKerrow and C. E. Rossiter. Thorax (London) 23, 340-349 (July, 1968).

The forced expiratory volume over 0.75 second (FEV_{0.75}) was measured monthly for three years in 28 working ex-miners with pneumoconiosis and for one year in 17 normal laboratory workers. A significant annual variation of 0.044-liter amplitude was found in the ex-miners with minimum and maximum values on February 2nd and August 3rd, respectively, and in normal subjects of about 0.10 liter. Atmospheric dry bulb temperatures had a cyclical pattern in phase with that of the ventilatory capacity of the ex-miners but there was no strong correlation between the deviations from these cyclical components. No relation was found with relative and absolute humidity and barometric pressure. Fourteen of the ex-miners had attacks of purulent sputum but these attacks did not acutely lower the ventilatory capacity although they were associated with a greater annual decline in it. The cyclical variation in ventilatory capacity may represent an intrinsic biological rhythm, perhaps modified by environmental temperature.

--J. Am. Med. Assn. References & Reviews

- 960 A Cooperative Study of Certain Measurements of Emphysema. W. M. Thurlbeck, et al. Am. Rev. Resp. Dis. 98, 217-228 (Aug., 1968).

Forty paper-mounted whole lung sections were examined by 9 observers expert in the pathology of emphysema. There was wide variation in interpretation of the presence or absence of emphysema, the type of emphysema, and the extent and severity of the disease. This was attributed, in part, to the different techniques used to measure emphysema and the nature of material studied. The major difference was attributed to interobserver variation, particularly of 2 observers who saw large amounts of panlobular emphysema. There was generally a similarity in ordinal ranking. At the present time, similar experiences may be described differently because of differences in interpretation. However, an agreed visual grading system may obviate many of these differences. Two references are given.

--Authors' summary

- 961 Cellular Effects of Laser Radiation. Light Microscopic Studies on Injury of the Mouse Liver. G. C. Faith, et al. Arch. Pathol. 86, 262-278 (Sept., 1968).

Bursts of ruby laser energy from 23 to 135 joules/sq cm were directed at the exposed livers of anesthetized mice. Immediately, light gray lesions appeared that extended hemispherically into the parenchyma. At high energies, there was cavitation and extrusion of tissue. Portions of the lesions were fixed, embedded in paraffin or epoxy resin, and examined microscopically. Cells were distorted, intercellular spaces widened, and staining properties altered. Nucleoplasmic constituents became aggregated, and cytoplasmic components were often markedly disarranged. Within the perspective of the literature on photic, thermal, and laser injury, it is concluded that a reasonable concept of the pathogenesis of laser-induced necrosis is one of heat-mediated denaturation and coagulation of cell proteins, and vaporization of tissue water, creating multiple intercellular and intracellular spaces. There are 73 references.

--Authors' abst.

SKIN DISEASES AND BURNS

- 962 Pulmonary Complications of Burn Patient. C. D. Shook, B. G. MacMillan, and W. A. Altermeier. Arch. Surg. 97, 215-224 (Aug., 1968).

Pulmonary complications are being seen with increasing frequency as a contributing cause of death in fatally burned patients. Thirteen burn patients who required continuous positive pressure ventilation for more than 48 hours were studied. A special mixture was used in the nebulization fluid in several patients and consisted of heparin, hydrocortisone, and gentamicin. Twelve of the patients died (92% mortality rate). Lesions found in the lung at autopsy included pneumonia, pulmonary edema, septic infarcts, tracheobronchitis, and atelectasis. Atelectasis was a frequent finding and was probably due primarily to continuous ventilation with a constant tidal volume without frequent hyperinflation. Hyaline membranes were observed microscopically in some patients and were attributed to prolonged use of high oxygen tension in the inspired air. The recommended therapeutic program for respiratory embarrassment in the burn patient includes aseptic management of adequate airway, frequent monitoring of arterial blood gas studies, x-rays, and sputum cultures, adequate humidification, nebulization mixture including heparin, hydrocortisone and gentamicin, and prevention of atelectasis by hyperexpansion of the lungs at frequent intervals.

--J. Am. Med. Assn. References & Reviews

- 963 Pseudomonas Vaccine and Hyperimmune Plasma for Burned Patients. I. Feller and C. Pierson. Arch. Surg. 97, 225-229 (Aug., 1968).

A Pseudomonas vaccine and human hyperimmune plasma have been prepared and used in 100 severely burned patients with a marked reduction in the incidence of and mortality from Pseudomonas septicemia.

--J. Am. Med. Assn. References & Reviews

- 964 Jean Henri Fabre and the Patch Test. A. Rostenbert, Jr., and L. M. Solomon. Arch. Dermatol. 98, 188-190 (Aug., 1968).

Jean Henri Fabre was a 19th century French entomologist who studied the effects of caterpillars on human skin. Living in almost total isolation in the French countryside, unaware of the dermatologist Jadassohn's simultaneous endeavors in a similar area, Fabre independently evolved an excellent system of epicutaneous patch testing. In his ten-volume treatise, "Les Souvenirs Entomologiques," Fabre carefully outlined his patch test method and described urticarial and eczematous contact dermatitis. This paper reviews the largely ignored contributions to cutaneous allergy made by this ingenious French entomologist 11 years before the concept of allergy was promulgated by von Pirquet.

--J. Am. Med. Assn. References & Reviews

01 132 3864

- 965 Nickel Earlobe Dermatitis. T. L. Watt and R. R. Vaumann. Arch. Dermatol. 98, 155-158 (Aug., 1968).

Seventeen young women who became allergic to nickel following earlobe piercing procedures were observed during a 12-month period. All of the women developed drainage, eczematous, pierced lobes after wearing implanted earrings two to four weeks. Ten of them subsequently developed more widespread reactions. Fifteen of the women had signs or symptoms of the atopic diathesis. The nickel earlobe dermatitis is frequently mistaken for a chronic infection of the earlobes.

--J. Am. Med. Assn. References & Reviews

- 966 Leprosy in the Toronto Area. A. L. Hudson. Can. Med. Assn. J. 99, 176-179 (July 27, 1968).

Leprosy can occur anywhere, and must be considered in the differential diagnoses of chronic skin disorders, to avoid failure to recognize it. A punch biopsy is a simple diagnostic measure and, provided that the pathologist is informed that Hansen's disease is a possibility, is a sine qua non in diagnosis. The treatment period is long and may be accompanied by puzzling complications. For this reason it is suggested that the management of leprosy should be in the hands of a physician who has had some experience with the disease. Both the physician and the public should be more aware of the existence of leprosy in areas other than the tropics, and especially in individuals who have lived in areas where the disease is endemic. The stigma attached to the word leprosy might well be avoided if the disease were referred to in all publications as Hansen's disease. There are 6 references.

--Author's conclusions

- 967 Benzoyl Peroxide-Sulfur Lotions. P. Vasanish. Arch. Dermatol. 98, 183-187 (Aug., 1968).

Benzoyl peroxide and sulfur lotions were applied to normal and acne skin and serial biopsies were studied. Benzoyl peroxide causes dilatation of upper dermal vessels and perivascular infiltrate, with only minimal epidermal edema. Addition of sulfur increases the epidermal reaction. Despite clinical improvement, no changes of comedones or sebaceous glands were found. The response to a primary irritant is predominantly dermal. In the absence of classical epidermal changes of primary irritant dermatitis, the exfoliation caused by benzoyl peroxide is probably secondary to a variety of dermal and epidermal processes, eg, vasodilatation, increased mitotic rate, defatting of stratum corneum, and the effects of oxidants on disulfide bonds of intercellular bridges or the cement substance. Relief of follicular obstruction is not obtained by direct action on the comedonic plug. The histologically observable effect of benzoyl peroxide and sulfur is maximal at the dermal level, closer to the original site of acne pathogenesis.

--J. Am. Med. Assn. References & Reviews

CHEMICAL HAZARDS

- 968 Myocardial Toxicity From Carbon Monoxide Poisoning. R. F. Anderson, D. C. Allensworth, and W. J. deGroot. Ann. Internal Med. 67, 1172-1182 (Dec., 1967).

Seven cases are described in two families, emphasizing the individual susceptibility to CO and the seriousness of the resulting myocardial lesion. A family of four was discovered unconscious in their tightly closed home; one unvented natural gas heater and a pilot light were burning. The infant was dead on arrival; COHb saturation of his venous blood was 55%. The father was admitted unconscious but, after oxygen therapy, regained consciousness. Five days later, however, he complained of sudden, severe, substernal pain; ventricular fibrillation ensued, followed by death. Autopsy revealed a mural thrombus in the left ventricle with coronary embolism. In another family, three women were poisoned while being transported by ambulance for about 6 hr. The cases and their therapy are discussed. Patients poisoned with CO should be observed with serial electrocardiograms. EKG abnormalities are frequent and may occur promptly or after the acute episode has subsided.

--APCA Absts.

- 969 Neurological Complications of Carbon Monoxide Poisoning. H. Garland and J. Pearce. Quart. J. Med. 36, 445 (1968).

Four patients suffering from severe accidental carbon monoxide poisoning are described. Attention is drawn to the gross and diffuse cortical damage which occurs and to the parietal lobe disturbances, with particular reference to their clinical presentation. In general, the prognosis is favourable, but occasional examples of permanent brain damage are known to occur. The pathology and physiology of CO poisoning are discussed and some of the appropriate literature is reviewed.

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

- 970 Determination of Fluoride in Bone With the Fluoride Electrode. L. Singer and W. D. Armstrong. Anal. Chem. 40, 613-614 (March, 1968).

Electrodes made from single-crystal sections of rare earth fluoride have been developed to measure fluoride ion activity in solutions. A simple direct method for determination of fluoride in bone with the use of a fluoride ion electrode and a conventional potassium chloride electrode is rapid and accurate. Factors such as pH, ionic strength, temperature, and some other ions must be rigorously controlled in both standard and unknown solutions to obtain meaningful results. The method is applicable also to fluoride in the ash of other normal and pathological calcifications.

--APCA Absts.

- 971 Hazards of Hydrogen Sulfide. P. D. Halley. Med. Bull. (Std. Oil N.J.) 27, 219-236 (Nov., 1967).

The physical properties and physiological effects of H_2S are reviewed. Its disagreeable odor occurs at low concentrations; at higher levels (500-1000 ppm), it becomes sweet-smelling. H_2S acts as an irritant to lung tissue in high concentrations, as an irritant to the eye in low-level, repeated exposures or in short exposures to high concentrations, and also produces respiratory paralysis at levels of 500-700 ppm or more. Skin contact is not considered significant, although a perforated ear drum can be a route of significant exposure. A table is provided with representative physiological responses to various levels of H_2S . Immediate unconsciousness with respiratory arrest and death in a few minutes follows exposure to 1000-5000 ppm. Maximum exposure level for 1 hr. without serious consequences is 170-300 ppm. Sources, concentrations, and actual cases of H_2S poisoning in the petroleum industry are cited. It is emphasized that negligence in carrying out safety precautions (use of respiratory protective equipment) is not limited to new employees.

--APCA Absts.

- 972 Lung Function Following Exposure To, and Recovery From, Nitrogen Dioxide. J. T. Davidson, et al. Israel J. Med. Sci. 3, 470-474 (May-June, 1967).

Albino rabbits (6 months to 1 yr. old) were exposed continuously to approximately 8-12 ppm of NO_2 and tested for pulmonary function after 3-4 months' exposure. During the first 12 weeks of exposure, 50-60% of the test animals died. Autopsies revealed extensive pulmonary congestion, edema, and bronchial pneumonia. In the 13 survivors, the over-all picture was one of severe airway obstruction with marked hyperinflation and arterial oxygen desaturation (decreasing significantly to 65 mm Hg). A significant increase in nonelastic resistance of the lungs was the most consistent and marked abnormality recorded. Mean resistance increased to 157 cm H_2O /l sec, compared with 37 in the controls. Static lung compliance was not significantly different. Four animals, removed to breathe normal air after respiratory physiological disturbances were well established (3-4 months), improved or recovered; the main residual abnormality was nonelastic resistance.

--APCA Absts.

- 973 The Renal Tubule in Lead Poisoning. I. Mitochondrial Swelling and Aminoaciduria. R. A. Goyer. Lab. Invest. 19, 71-77 (July, 1968).

Rats fed a diet containing lead acetate develop an excessive aminoaciduria within 3 weeks. Electron microscopy of kidneys shows two distinct histologic features, intranuclear inclusions and swelling of mitochondria. These changes are confined to cells of proximal convoluted tubules. The number of inclusions increases with time of ingestion of the lead-containing diet.

Mitochondrial lesions appear maximal after ingestion of the experimental lead diet for approximately 10 weeks. Increase in kidney weight, thought to be due to increase in fluid content of cells or "cloudy swelling," is positively correlated with the degree of aminoaciduria suggesting a transport defect for water and cations as well as amino acids. Electron microscopy shows that the usual elongated, rod-shaped mitochondria of the proximal renal tubule have become oval or rounded and have increased in volume. Cristae may be vesicular, but more often swelling is confined to the inner compartment and the cristae are shortened and marginal. Matrical granules become less homogeneous and tend to clump. It is concluded that the severe alterations observed in the mitochondria of proximal tubular lining cells of lead-intoxicated rats reflect an impairment of energy metabolism and are, therefore, an important factor in the pathogenesis of the observed renal tubular dysfunction. There are 23 references.

--Author's abstr.

- 974 Pulmonary Surface Tension After Sulfur Dioxide Exposure. L. M. Kahana and M. Aronovitch. *Am. Rev. Resp. Dis.* 98, 311-314 (Aug., 1968).

The surface tension of lung extracts has been measured with the modified Wilhelmy balance after short, high level exposure of rats to sulfur dioxide. The findings were interpreted as demonstrating an increase of surfactant activity that might suggest that this increase in surfactant activity has been caused either by increased production of surface-active substance or by some qualitative change in it. Results of an earlier study is associated with a decrease in lung elastic recoil, and the possibility was considered that such changes might be related to the pathogenesis of emphysema. There are 26 references.

--Authors' summary

- 975 Adverse Effect of Oxygen on Tracheal Mucus Flow. G. A. Laurenzi, S. Yin, and J. J. Guarneri. *New Engl. J. Med.* 279, 333-339 (Aug. 15, 1968).

The effect of oxygen on tracheal mucus flow was measured in young cats by a particle-transport technic. Any deviation from ambient oxygen tension in the inspired air, high or low, had an adverse effect on mucus flow; 100 per cent oxygen produced marked impairment. Basal mucus flow was improved, and the adverse oxygen effects were prevented and reversed by epinephrine compounds and adenosine triphosphate. These results, which are interpreted in terms of inhibition of carbohydrate metabolism by oxygen and the positive effect of catecholamines on this function, suggest a subtle, but potentially dangerous, form of oxygen toxicity. There are 23 references.

--Authors' abstr.

- 976 The Effect of Arsenic on Inflammation. O. J. Stone and Carolyn J. Willis. *Arch. Environmental Health* 16, 801-804 (June, 1968).

There is clinical and experimental evidence that an amount of arsenicals which will not produce lesions on normal skin will markedly increase the severity of a quantitated, induced, bacterial infection. It is also known that suppression of early inflammation increases the severity of bacterial infections. An experimental model is presented in which arsenic is shown to prevent one type of early inflammation. It is proposed that arsenic damages enzymes of inflammation which are active before the cellular phase occurs. There are 15 references.

--Authors' abstr.

- 977 Severe Occupational Poisoning With Cadmium Vapors and Subsequent Broncho-Pulmonary Symptoms. F. Heully, et al. *Arch. Maladies Prof.* 27, 215-220 (Jan.-Feb., 1966). French.

A case report is given of a 55-year-old male showing acute pulmonary edema, dyspnea, cyanosis, raised temperature and pulse, and arterial hypotension. Clinical and radiological details are included. Two days previously he had been cutting steel for an electric furnace, using a propane blowtorch. A study determined that the electric furnace had been used to recover nickel from Ni-Fe electrodes, and that occasionally stray Cd-Fe electrodes were inadvertently included. In fact, while cutting the steel with his blowtorch, the worker had noted the sheet metal had taken on a sulfur-yellow color and that it produced intense, light yellow flames. It is believed that cadmium was volatilized, although the presence of these other metals is mentioned: iron, nickel, chromium, cobalt, and arsenic. Manganese, known to produce similar symptoms, was presumed to be present in very low quantities. While working, this subject had noted, at first, sensation of constriction of his throat, then, of his chest, as well as a "salty mouth." Recovery followed treatment with antibiotics and cardiovascular analeptics.

--APCA Abstrs.

- 978 Upper Respiratory Tract Lesions From Chromic Acid Aerosol. L. Hanslian, et al. *Pracovní Lékarství* 19, 294-298 (Sept., 1967). Czech.

Otolaryngological examination of 77 persons exposed to chromic acid aerosol during chrome plating revealed: nasal mucosa irritation (47.75%), atrophy (34.8%), perforation of the septum (19.3%), atrophy of the nasal skeleton (9.0%), rhinitis sicca anterior (34.8%), and lesions of the sensory epithelium (23.1%). Papillomas of the oral cavity and the larynx were found in 14 persons. They contained 9.25 μ g of chromium and were probably caused by the prolonged exposure (6.6 years average) to a high chromium (4 μ g/l). Histochemical examinations of the excised tumors confirmed the diagnosis of papillomas; no marked signs of atypical growth or malignant degeneration were present.

--APCA Absts.

- 979 Thyroid Changes in Cases of Quebec Beer Drinkers' Myocardiosis. P. E. Roy, J. L. Bonenfant, and L. Turcot. *Am. J. Clin. Pathol.* 50, 234-239 (Aug., 1968).

Thyroid changes were found associated with the myocardial lesions in the Quebec epidemic of beer drinkers' cardiomyopathy. Colloid depletion of the thyroid was the most constant and important finding. The quantity of colloid in the tissue sections was evaluated using a numerical scanner that measured the density of the staining reaction with Schiff's solution. The cobalt salts added to the beer during the brewing process and absorbed by the patients in significant amounts may constitute the main etiological factor. Cobalt has been shown in the past to produce similar changes in the thyroid gland.

--J. Am. Med. Assn. References & Reviews

- 980 Food Poisoning Due to Copper in Morning Tea. P. O. Nicholas. *Lancet* 2, 40-42 (July 6, 1968).

An unusual form of acute food poisoning due to copper sulphate in the water of an unserviced gas hot-water geyser is described. The morning tea brewed with the water caused acute vomiting and diarrhea in 20 workmen. Unless care is taken to prevent copper corrosion in water heaters, the amount of copper in drinking water could be raised. Though this contamination may not cause symptoms initially, copper ions could be built up in the human body over a long period and be a source of ill health.

--J. Am. Med. Assn. References & Reviews

- 981 Copper, Zinc, Cadmium, and Lead in Human Blood From 19 Locations in the United States. J. Kubota, V. A. Lazar, and F. Lossee. *Arch. Environmental Health* 16, 788-793 (June, 1968).

Copper (Cu), zinc (Zn), cadmium (Cd), and lead (Pb) were determined in 243 blood samples of male residents of 19 cities in the continental United States. The mean Cu and Zn concentrations of all samples agreed closely with values reported by other investigators. The means among the 19 locations, however, differed by threefold in Cu and fivefold in Zn. The levels of Cu and Zn in blood in 17 locations were normally distributed about their means except in two locations. Unlike Cu and Zn, the concentrations of Cd and Pb varied widely among samples from a given location. There are 20 references.

--Authors' abst.

- 982 Studies in Humans on the Distribution of Mercury in the Blood and the Excretion in Urine After Exposure to Different Mercury Compounds. K. D. Lungren, A. Swensson, and U. Ulfvarson. *Scand. J. Clin. Lab. Invest.* 20, 164-166 (Nov., 1967).

Using neutron activation analysis, the mercury concentration in blood of 7 nonexposed control persons was 6-12 ngm/gm. In a group of persons exposed to methyl mercury vapors, the mercury content in whole blood was 70-180 ngm/gm, in plasma 3-10 ngm/gm. A group of persons exposed to metallic mercury vapors had a mercury concentration in whole blood of 12-90 ngm/gm, in plasma 5-74 ngm/gm. The mercury concentration in urine was hardly increased in the alkyl mercury group but there was a fair increase in the metallic mercury group. It is evident that the distribution of mercury in blood is quite different after exposure to different mercurials and so is the rate of excretion in urine. The distribution-excretion pattern may be used for diagnostic purposes, but excretion of mercury cannot be used to evaluate exposure to alkyl mercury salts.

--APCA Absts.

- 983 Relationship Between Environmental Exposure to Mercury and Clinical Observation. P. G. Rentos and E. J. Seligman. Arch. Environmental Health 16, 794-800 (June, 1968).

The problems of refining metallic mercury as they relate to the health of the worker are described. The reliability of several methods for assessing the work environment is shown and a relationship between high mercury environment, increased body load of mercury (as evidenced by urinary excretion), and symptoms of mercurialism in exposed mill workers is demonstrated. Because of the poor reliability of urine mercury levels in determining impending or early mercury poisoning, several biochemical analyses on blood of mill workers were performed. Support is given to the current threshold limit value (TLV) for mercury. However, the data show that this level contains no more than a safety factor of 2. There are 12 references.

--Authors' abst.

- 984 Gas Chromatography of Nickel Carbonyl in Blood and Breath. F. W. Sunderman, Jr., N. O. Roszel, and R. J. Clark. Arch. Environmental Health 16, 836-843 (June, 1968).

A gas chromatographic method has been developed for the detection of nickel carbonyl in blood and breath. Nickel carbonyl has been identified in blood following exposure of rats to nickel carbonyl by inhalation. Nickel carbonyl has also been identified in breath following administration of nickel carbonyl to rats by intravenous injection. Therefore, this study has demonstrated that nickel carbonyl can pass across the pulmonary alveolus in either direction, without degradation or metabolic alteration. The gas chromatographic method is suggested as a technique for monitoring the concentrations of nickel carbonyl in industrial atmospheres and in the blood of workmen who are accidentally exposed to inhalation of nickel carbonyl. There are 17 references.

--Authors' abst.

- 985 Twenty-Four Cases of Lead Poisoning, Ten Years Later. A. B. Rakow and J. Lieben. Arch. Environmental Health 16, 785-787 (June, 1968).

In this follow-up survey of 24 individuals whose conditions had been diagnosed as lead poisoning ten years ago, it was learned that eight are still working in the same industry. Two of these are working in an industry with low lead exposure because of their frequent symptoms. Three additional men had returned to their jobs but only stayed a short period. Thirteen have, on advice of their physicians, never returned to their previous occupations and are now working in different ones. There are 4 references.

--Authors' abst.

- 986 Acute Carbon Tetrachloride Hepatotoxicity. IV. Liver and Serum Enzyme Activity During the Acute Damage Phase. B. D. Dinman and I. A. Bernstein. Arch. Environmental Health 16, 770-776 (June, 1968).

The general impression obtained from review of literature concerning CCl_4 -induced hepatotoxicity suggests that one should find a reciprocal relationship between serum enzymes and liver activity. This especially would apply if hepatocytes passively lost enzymes as a result of altered permeability or actual cellular disruption. Hepatocytes damaged by CCl_4 may produce enzyme in response to injury. Whether such evolution could arise from de novo synthesis, activation of nascent enzyme, overloading of protein degradation pathways, or CCl_4 -induced steric rearrangements cannot be clearly determined. Regardless of the precise mechanism of enzymic elaboration, an increase in these cellular and serum catalysts could represent a homeostatic rather than retrograde response; glutamic pyruvic transaminase (GPT)- and glutamic oxaloacetic transaminase (GOT)-induced gluconeogenesis may be a compensatory response to glycogen depletion. Possible compensatory ends met by other cellular enzyme increases are not apparent at this time. There are 18 references.

--Authors' abst.

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- 987 Acute Carbon Tetrachloride Hepatotoxicity. V. Enzymatic Activity and Structural Concomitants During the Regenerative Phase. B. D. Dinman and I. A. Bernstein.
Arch. Environmental Health 16, 777-784 (June, 1968).

Serum and hepatic enzyme activity were studied during the regenerative phase following CCl_4 -induced liver damage. The structural changes seen in the 36th through 72nd hour postexposure period were consistent with previous descriptions of the response. Other investigators have also noted biochemical concomitants of regeneration during this period, i.e. increased protein synthesis and mitotic activity. Serum enzymes were found to increase in association with these regenerative changes. The increase of serum enzyme was distinctly separable from prior elevations associated with acute tissue damage. Smaller doses (and possibly lesser degrees of damage) caused this regenerative peak to appear earlier than with larger CCl_4 doses. The levels of hepatic glutamic oxaloacetic transaminase (GOT) and glutamic pyruvic transaminase (GPT) increased prior to the elevation of serum enzymes at the low CCl_4 dose, but paralleled the serum increase at the higher dose level. There are 9 references.

--Authors' abst.

- 988 The Effect of Aerially Applied Malathion on an Urban Population. A. L. Gardner and R. E. Iverson. Arch. Environmental Health 16, 823-826 (June, 1968).

During the St. Louis encephalitis epidemic in Corpus Christi, Tex., in the fall of 1966, malathion was applied by aerial spraying over the city and outskirts to control the vector mosquito. A group of 119 volunteers who received varying degrees of exposure to this spray was studied. This involved comparing pre-spray and postspray cholinesterase activities and compiling histories of exposure and symptoms. A 5% incidence of mild and transient symptoms such as headache, nausea, and weakness was noted in the exposed volunteers, but there were no pathognomonic signs. There was no correlation of symptom frequency or severity with enzyme activity and no statistically or clinically significant change in enzyme activity related to time of spraying. It was concluded that there is negligible risk to human health involved in aerial applications of malathion. There are 20 references.

--Authors' abst.

INDUSTRIAL DUSTS

- 989 Alveolar Proteinosis. Its Experimental Production in Rodents. P. Gross and R. T. P. deTreville. Arch. Pathol. 86, 255-261 (Sept., 1968).
Reprints available from Industrial Hygiene Foundation, 5231 Centre Ave., Pittsburgh, Pa. 15232.

Rats exposed to very high concentrations of quartz dust developed alveolar proteinosis. This was associated in some regions with foci of desquamative pneumonitis. In the proteinaceous material, there was much aggregated silica. Guinea pigs and hamsters exposed in the same chamber simultaneously with the rats had extensive, desquamative pneumonitis associated with relatively little alveolar proteinosis. With the lapse of time, the proteinaceous material in the air spaces tended to shrink and become friable and fragmented. Many air spaces became partially emptied of the proteinaceous material, and the regions of involvement became smaller. Alveolar proteinosis is considered to consist basically of two simultaneously occurring disturbances: failure of the alveolar clearance mechanism, and excessive production of alveolar macrophages. Perhaps a deficiency or lack of autolytic enzymes in the macrophages may also be involved. There are 9 references.

--Authors' abst.

- 990 An Unusual Course of Pneumoconiosis in a Welder With Bilateral Spontaneous Pneumothorax (Polish). J. Dobrowski, et al. Pol. Tyg. Lek. 22, 1814-1815 (Nov. 20, 1967).

A case of an unusual course of iron pneumoconiosis is presented. Despite removal of the patient from his work in welding fumes, the disease progressed, leading to almost simultaneous appearance of spontaneous bilateral pneumothorax. Re-expansion of the left lung was initiated early. The right lung was collapsed after three weeks of treatment. Right-sided thoracotomy was performed and emphysematous bullae were resected. Histopathologic examination of the specimen revealed a fibrous nodule containing numerous deposits of pigment that gave a positive reaction for iron.

--Am. Rev. Resp. Dis. Absts.

- 991 Wet vs. Dry Gas Cleaning in the Steel Industry. H. C. Henschen.
J. Air Poll. Control Assn. 18, 338-342 (May, 1968).

Deciding whether the gas should be cleaned by a "dry" system or a "wet" system requires a full consideration of all factors of which the capital cost is only one. Anticipating the various problems which might be expected and designing adequate measures for each calls for major engineering effort, but only then can a best choice be made. The principles which govern the above are illustrated by a typical selection of gas cleaning equipment to be used as part of a BOF steel making installation. Two entirely different gas cleaning systems are presently in BOF service in North America. Both will do an excellent job if properly designed. Either system will cost in excess of \$2,000,000 and will require careful control and large amounts of electrical power. One system, the dry electrostatic precipitator, requires humidification of the gas; protection against explosions; elaborate electrical controls, insulators, etc.; and a rugged handling system for the bone dry dust collected. The other system, wet washing with water, is easier to control but uses large quantities of water and electric power. As in the case of the "dry" system, handling the dirt collected is a difficult problem requiring careful study and choice of equipment. In either case the dust may be discarded or reused, but it must be handled with care lest it become an air or stream pollution problem all over again.

--Author's abstr.

- 992 Submicron Air Pollution and the Use of High Efficiency Filters. D. G. Carly.
Heating Ventilating Engr. J. Air Conditioning (London) 41, 219-222 (Nov., 1967).

Filter properties of submicron particle filters are discussed, after a description and graphic representation of the particle sizes of airborne impurities. The filter structure should permit the accumulation of large dust quantities without excess rise in pressure loss. Since the course of small particles (less than 0.3μ) across the filter will not be rectilinear, this increases the probability of their hitting a filter fiber and being retained. Adhesion can be improved by moistened filter fibers as well as those having electrostatic properties. Controlled acceleration of the airflow over the normal air velocity range of the filter also increases its efficiency. Capacity and exchange intervals are considerations in the selection of a filter. Exchange intervals mainly depend on the relationship between filter surface area, air volume, dust particle size, and dust concentration. For a given end resistance the life time of a submicron installation of the disposable paper cell variety can be nearly squared by doubling its total surface. All submicron filters should be protected by relatively cheap coarse filters to extend their life expectancy. The sodium flame test, developed by the British Standards Institute, is standard for testing high-efficiency filters. It provides a quick and accurate test basis for comparing the dust removal efficiency of the various makes and types of filters.

--APCA Abstrs.

- 993 Environmental Control in the Treatment of Allergic Individuals. L. S. Nelson.
Lancet 86, (5), 221-225 (May, 1966).

Roughing and electrostatic filter types are discussed and several described. Electrostatic precipitators can stop more than 90% of the microscopic solids afloat in the air, including bits as small as 0.001μ . Dry roughing filters are 30-95% efficient on particles larger than 5μ , but are costly and must be replaced when loaded with dirt. Efficiency studies on particle removal are of three types: the weight method, the dust spot staining method, or the particle count method. Evaluation procedures for ultrahigh-efficiency filters and electrostatic precipitators are fairly good, but there are no standards at present for the evaluation of roughing filters, nor is there any agreed standard for the evaluation of pollen or virus efficiencies of filters. Standardization of air cleaning devices is urgently needed.

--APCA Abstrs.

- 994 The Prevalence of Coal Workers' Pneumoconiosis. W. K. C. Morgan.
Am. Rev. Resp. Dis. 98, 306-310 (Aug., 1968).

A retrospective analysis was made of seven surveys of the prevalence of coal workers' pneumoconiosis in Appalachia. An attempt was made to relate the rank of the coal mined in a particular region to the prevalence of coal workers' pneumoconiosis in the same region. It was concluded that the hypothesis of Hart and Aslett holds true in Appalachia in that the higher the rank of coal mined, the greater the chance of the disease developing.

--Author's summary

- 995 Asbestosis in Western Australia. J. L. Elder. *Med. J. Australia* 2, 579-583 (Sept. 23, 1967).

Thirty-one patients with asbestosis or asbestosis with silicosis have been studied at Sir Charles Gairdner Hospital over a five-year period. Twenty-eight patients worked at Wittenoom Gorge and 3 patients, at an asbestos cement works. The diagnosis of asbestosis was made on the basis of a history of exposure, results of pulmonary function tests characteristic of the diffuse interstitial fibroses, and compatible roentgenographic changes. From a study of these patients, the following points emerged. (1) Under work conditions at Wittenoom Gorge in the 1950's, a period of one and one-half to 12 years' exposure was sufficient to produce appreciable disability and death in 7 patients whereas at the cement works, prior to 1956, a period of 17 to 27 years was necessary to produce disability, with death in only one patient. (2) Asbestosis often progresses after cessation of exposure, and pulmonary infection appears to accelerate this progress. (3) Once roentgenographic changes are obvious, the disease is well advanced and, as a corollary, a diagnosis of asbestosis on roentgenographic examination of the chest in early cases is extremely difficult and there is much observer variation, even among experts. (4) In an asbestos worker, a change in vital capacity in some instances may indicate asbestosis before there is a definite change on the chest film. As a prophylactic measure, estimation of the vital capacity before employment and at yearly intervals thereafter, in addition to the yearly examination of the chest film, may indicate which workers should move to a less hazardous industry. (5) Steroids do not appear to play any part in arresting the progress of the disease; in fact, as infection tends to accelerate fibrosis in the experimental animal, and clinically in man, steroids are best avoided. In none of the 31 patients studied did calcified pleural plaques or mesothelioma develop, and bronchial carcinoma occurred in only one patient; but these complications would not be expected in the patients at Wittenoom Gorge for another 10 to 20 years.

--Am. Rev. Resp. Dis. Abstr.

Editor's Note: See also Abstract No. 912, this issue. Readers concerned about asbestos bioeffects will be interested in the program of the Foundation's 3rd Fibrous Dust Seminar (see Editorial, this issue).

--R. T. P. deT.

- 996 Dustfall in the Vicinity of Cement Plants With Respect to Possible Disabilities. Part II. H. J. Einbrodt, et al. *Arch. Hyg. Bacteriol.* 151, 211-229 (Aug., 1967). German.

Air-borne dust levels in the environment of cement works were measured and their chemical and mineralogical composition examined. Values of SiO_2 and Al_2O_3 ranged, respectively, from 14.57 and 3.97% at 400 m to 17.29 and 4.20% at 1000 m. Fibrous changes in the lungs of the neighboring population are not expected, owing to the very low quartz content. Preliminary examination showed that there was no increase in bronchitis in females dwelling near cement works, compared with those in other living areas.

--APCA Abstr.

PHYSICAL ASPECTS OF THE ENVIRONMENT

- 997 Heatstroke Caused by Dehydration and Physical Effort. E. Sohar, et al. *Arch. Internal Med.* 21, 159-161 (Aug., 1968).

Heatstroke developed in a young, well-acclimatized man, who, while dehydrated, participated in strenuous physical exercise of short duration. The clinical picture included coma, convulsions, excessive body temperature, disturbances in clotting and other enzymatic mechanisms, and acute renal failure. Therapeutic measures included rapid cooling under anesthesia (to avoid convulsions and shivering), maintenance of water and electrolyte balance, transfusions of fresh blood and plasma, and hemodialysis. Three features of this case—continued sweating, short duration of a severe physical effort, and mild ambient temperature—support the concept that heatstroke develops when excessive body temperature becomes in itself a noxious agent, damaging the body's tissues. The steep rise in body temperature is due to the inability of the heat-dissipating mechanism to dissipate excess body heat, either because the mechanism is damaged or because of overloading of a normal heat-dissipating mechanism.

--J. Am. Med. Assn. References & Reviews

ENVIRONMENTAL MEASUREMENTS

- 998 Standardization of Methods for Measurement of Air Pollutants. B. E. Saltzman.
J. Air Poll. Control Assn. 18, 326-329 (May, 1968).

Currently available compilations of methods of air analysis are listed. Collaborative testing is urgently needed to reconcile differences and to demonstrate the accuracy of these methods. The Analytical Methods Evaluation Service of the National Center for Air Pollution Control conducted a survey of the instruments and manual methods of analysis in use. Responses are tabulated from about 80 laboratories, in 28 states and 3 foreign countries. Sulfur dioxide was the most widely measured pollutant. The first collaborative study organized by the Analytical Methods Evaluation Service is described. The purpose was to evaluate the permeation tube technique as a primary standard method for generating known sulfur dioxide concentrations for instrument calibration and methods testing. Although a good beginning has been made, the testing of methods for measuring air pollutants has barely begun. There are 20 references.

--Author's abstr.

- 999 New Procedure Checks Vehicle Exhaust Emissions. Anon.
Environ. Sci. Technol. 2, 13-16 (Jan., 1968).

The N. J. Department of Health awarded a two-year contract to Scott Research Laboratories to develop a rapid low-cost diagnostic test for exhaust emissions from automobiles. It was this project that led to a new test sequence and equipment that takes 1 min. to complete at a cost of 30 to 40 cents per test. The test procedure gives information on the composition of automobile exhaust emissions. These data, in turn, provide a basis for determining the proper maintenance program needed to reduce vehicle emissions. The test procedure takes only a minute for a complete analysis and gives data equivalent to those obtained from the lengthier (17 min.) existing federal procedure that was used to set federal emission standards for 1968 automobiles. The Scott system employs a set of inertial rolls with a fixed load that serves as external loading to absorb the power output of the automobile. This fixed loading system is inexpensive and requires minimal skill to operate. Yet, data so obtained correlate well with those from the federal procedure.

--APCA Abstrs.

- 1000 Field Testing Program for Carbon Monoxide. J. D. Rayfield.
J. Med. Assn. State Alabama 36, 1494, 1496, 1498-1499, 1502 (June, 1967).

Two programs are described which are related to public health and CO poisoning: a home-testing program, and a school bus testing program. The first program, which began Feb. 2, 1965, led to testing of homes after physician referral of a family or persons with symptoms of CO poisoning. All household appliances which could be a source of CO were tested, including hot water heaters, gas ovens, ranges, and space heaters. To date, 223 appliances have been tested, of which 101 were positive for CO. In a follow-up inspection of defective appliances, 93% of the occupants claimed either complete recovery or marked improvement. Case histories are described. The unvented space heater was the primary source of CO poisoning in the home. Continuous exposure to very low levels of CO in homes is a very definite health hazard. The second test program was initiated after two children arrived at school unconscious; they had been the first to be loaded on the school bus and had been riding about 45 min. As a result, 191 school buses were tested and CO found in levels from a trace to 800 ppm in 99 buses. Exhaust systems of school buses should be redesigned to obviate possible exhaust leaks into the bus through the emergency door and the floor board. School buses should be examined frequently for possible CO exposure of occupants.

--APCA Abstrs.

- 1001 Appraisal and Modification of West-Gaeke Method for Sulfur Dioxide Determination.
N. M. Trieff, et al. J. Air Poll. Control Assn. 18, 329-331 (May, 1968).

Reliable results can be obtained by the West-Gaeke method for the determination of SO₂ if stock solutions of dye are made from the same dye batch at the same time. Gum arabic enhances significantly the stability of the SO₂-tetrachloromercurate complex only at high

concentrations of SO_2 ($>8 \mu\text{g/ml}$). The rate of color decay is greater than that which has been indicated in the literature. The absorbance of the reagent blank rises with time. Error analysis showed the probable relative error of SO_2 concentration to be $\pm 9.6\%$. There are 12 references.

--Authors' conclusions

- 1002 Measurement of Odorous Air Pollutants. T. Lindvall.
Nord. Hyg. Tidskr. 47 (2), 41-71 (1966). Swedish.

Psychometric methods for the subjective determination of odorous air pollutants are surveyed, with a discussion of the physiological and psychological bases of smell. Since odors are a problem of environmental hygiene, they are studied at present by the determination of an odor threshold in a series of diluted air samples. Some of the problems involved in such determinations are mentioned: individual variation, adaptation, background variables, climate, etc. Psychometric methods used, such as stimulus presentation and indicator response, and the principles of extrapolating supraliminal intensities, are discussed, as well as the different types of olfactometers. Odor thresholds found in the literature are rarely similar, due to the inaccuracy of the physical and chemical analytic methods used and to the varying statistical and sampling techniques employed. Different odors may also interact so that the threshold to the combined smells may not be merely additive. Annoyance from odors is best studied by epidemiological methods where the exposure dose is known.

--APCA Absts.

PREVENTIVE ENGINEERING

- 1003 New High-Efficiency Mist Collector. J. W. Coykendall, E. F. Spencer, and O. H. York.
J. Air Poll. Control Assn. 18, 315-318 (May, 1968).

The recently developed York Type P acid mist scrubber collects phosphoric acid mists and other very fine liquid particulates with very high efficiency with moderate pressure drop and high throughput. The collector consists of a single vessel containing two stainless steel wire mesh contactors. The collector converts submicron size acid mist into larger liquid particles which are collected and separated from the gas stream before being discharged from the collector. The first commercial unit started operation in July, 1964, and four additional units have since been installed. Collection efficiency is 99.9+% at a pressure drop of 35-40 in water gauge. The scrubber is compact and has no moving parts. Collected acid drains by gravity to a receiving tank. Experimental development work is described and design parameters such as efficiency, gas velocity, and pressure drop are discussed. There are 4 references.

--Authors' abst.

- 1004 Operating Experience With a Flooded Disc Scrubber - A New Variable Throat Orifice Contactor.
A. B. Walker and R. M. Hall. J. Air Poll. Control Assn. 18, 319-323 (May, 1968).

On the basis of both laboratory tests under controlled conditions and field tests on a variety of applications, it has been shown that the performance of the flooded disc scrubber, a new variable throat orifice contactor, is equivalent in performance to other types of inertial impaction scrubbers - as predicted by both the inertial impaction and energy input theories of particulate scrubbing. It is further evident, from the correlation of pilot and full scale scrubber operations on given applications, that there is little, if any, scale-up factor required in the application of pilot scale data to full scale design. However, in applications where there is a high degree of variation in process conditions, care must be taken to execute pilot plant tests over the entire range of the process variables or under conditions closely simulating anticipated full scale conditions. There are 13 references.

--Authors' summary

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COMMUNITY AIR HYGIENE

- 1005 Estimates of Air Pollution in Great Britain in 1966. A. Parker.
Smokeless Air (London) 38 (144), 114-115 (Winter, 1967).

Estimates, which will be included in the Clean Air Year Book of 1968-69, are tabulated. The total amounts of pollutants discharged from the commercial and industrial consumption of coal and oil were 0.96 million tons (m. tons) of smoke, 0.6 m. tons of grit and dust, and 6.28 m. tons of SO_2 . From the domestic and industrial consumption of coke, 0.97 m. tons of smoke, 0.6 m. tons of grit and dust, and 4.26 m. tons of SO_2 were produced. All this pollution is estimated to have emanated from the combustion of 172.1 m. tons of coal, 12.6 m. tons of coke, and 59.0 m. tons of oil. Pollutants from the operation of road vehicles, using 11,322 m. tons of gasoline and 4,041 m. tons of diesel fuel, are listed: CO (5.38 m. tons), hydrocarbons (0.276 m. tons), aldehydes (0.013 m. tons), oxides of nitrogen (0.23 m. tons), and SO_2 (0.05 tons).
--APCA Absts.

- 1006 Effects of Air-Fuel Stoichiometry on Air Pollutant Emissions From an Oil-Fired Test Furnace.
J. H. Wasser, R. P. Hangebrauck, A. J. Schwartz.
J. Air Poll. Control Assn. 18, 332-337 (May, 1968).

This paper describes an experimental, domestic-sized, oil-fired furnace to be used for evaluation of fuel additives and equipment design modifications in reducing air pollutant emissions. Operating data and emissions of particulate matter, smoke, carbon monoxide, gaseous hydrocarbons, oxides of nitrogen, and oxides of sulfur are reported over the range of operable air-fuel ratio. Emission levels are interpreted in terms of key operating parameters and potential areas for reduction of emissions. There are 19 references.

--Authors' abst.

- 1007 Injury by Sulfur Dioxide, Hydrogen Fluoride, and Chlorine as Observed and Reflected on Vegetation in the Field. I. J. Hindawi. J. Air Poll. Control Assn. 18, 307-312 (May, 1968).

Plants were examined at three different locations in the eastern part of the United States to determine whether damage from air pollution had occurred. This paper discusses sulfur dioxide damage in the metropolitan New York City area; hydrogen fluoride damage near a glass fiber manufacturing plant in the midwest; and hydrochloric acid mist and chlorine damage from a manufacturing operation in an eastern state. The symptoms that developed in vegetation were often found to be similar. Chemical and microscopical analyses were helpful in diagnosing the toxicants. There are 24 references.

--Author's abst.

- 1008 Ultrastructural Effects of Air Pollution on Lung Cells. R. F. Bills.
J. Air Poll. Control Assn. 18, 313-314 (May, 1968).

The lungs of exposed mice taken during 2- to 3-hour heavy smog periods (over 0.4 ppm total oxidants) showed various degrees of cytoplasmic damage in the alveolar epithelial cells. The extent of damage was markedly age-dependent. Alveolar wall cells taken during heavy smog from 5-month-old animals contained slightly more lamellar inclusion bodies than corresponding animals kept in clean air. The cytoplasm of alveolar cells of 9-month-old animals sacrificed during heavy smog was severely disorganized; however, animals of this age showed a marked recovery 14 hours following the smog peak. In a group of older mice (21 months), similar cytoplasmic damage was obvious, and those sacrificed 24 hours after the heavy smog peak showed even more cellular disruption, suggesting irreversible damage in the older animals. The effect of synthetic photochemical smog showed a pattern of ultrastructural alterations similar to that of the heavy natural smog. Some permanent changes occurred in alveolar cells of 15-month-old mice. Partial recovery of lining cells took place, but few wall cells and phagocytes remained. If older lung tissue has relatively fewer wall cells as is indicated, recovery is decreased to the point of permanent damage. Coupled with extensive disruption of lining membranes, exposures of this nature may well cause the death of older animals. There are 9 references.

--Author's abst.

- 1009 Biological Effects of Urban Air Pollution. V. A Study of Effects of Los Angeles Atmosphere on Laboratory Rodents. L. G. Wayne and L. A. Chambers.
Arch. Environmental Health 16, 871-885 (June, 1968).

Rodents exposed to the ambient atmosphere of Los Angeles throughout their lives have been studied in comparison with animals maintained in smog-filtered atmospheres. In aging inbred mice of certain strains, there was an increased incidence of pulmonary adenoma. In one strain mortality of males (but not females) during the first year of life was increased. Severe smog episodes caused lung tissue alterations at the ultrastructural level, especially in mice older than 15 months. Severe episodes produced transient increases in pulmonary resistance in old guinea pigs but no demonstrable chronic or cumulative effects on this parameter. In guinea pigs sensitized by prior stress treatment, urinary excretion of 17-ketogenic steroids was enhanced by ambient atmosphere exposure. After two or three years of exposure, rabbits exhibited reduced activity of glutamic oxalacetic transaminase in blood serum. There are 14 references.

--Authors' abstr.

- 1010 Acute Effects of Air Pollutants on the Lungs. D. M. Aviardo and H. Salem.
Arch. Environmental Health 16, 903-907 (June, 1968).

The inhalation of chemicals initiates responses which can be grouped into four areas: (1) the airways which respond by bronchoconstriction to initiate the cough reflex; (2) the bronchial blood vessels which undergo changes to reduce absorption of the chemical substances via the bronchial mucosa; (3) the pulmonary blood vessels which respond to reduce absorption of the toxic irritants via the alveolar capillaries; and (4) the heart and systemic vessels which retard the distribution of the chemical substance to the vital organs. There are 38 references.

--Authors' abstr.

- 1011 How Weather Affects Air Pollution—And Vice Versa. D. Lohman.
Penn. Health 28, (2), 12-14 (Summer, 1967).

The meteorological conditions which are important to air pollution are discussed: dispersion (lateral, vertical), wind speed, and stability. Where the temperature of a layer of atmosphere increases instead of decreasing with height, an inversion condition exists and the air is very stable, capturing air pollutants below the warmer layer. When subsiding layers of air become warmer than the layers of air beneath them, an inversion, termed a subsidence inversion, is formed. Both kinds of inversions can affect air pollution. Air pollution may also affect the weather by forming condensation nuclei for raindrops, thus leading to increased rainfall, or, if too many condensation nuclei form, the water vapor condenses into a mist rather than falling as rain, thus causing some droughts. Air pollution, aside from changing air temperature by the shielding effect of CO₂, may also decrease the amount of sunshine reaching the earth's surface.

--APCA Abstrs.

- 1012 Recovery of Heat and Chemicals From Kraft Furnace Flue Gases. I. S. Shah.
Paper Trade J. 152, 65-67 (March 11, 1968).

The recovery furnace is the prime source of kraft mill air pollution. The mechanism of the release of sodium compounds and sulfur-bearing malodorous gases is outlined. For the recovery of heat and chemicals from the flue gas leaving the recovery furnace there are three systems in wide use in North America: the cascade precipitator system, the cyclone-precipitator system, and the venturi-evaporator-scrubber system. The operating characteristics and the advantages and disadvantages of these systems are discussed.

--APCA Abstrs.

- 1013 Air Pollution Problems at a Proposed Merseyside Chemical Fertilizer Plant: A Case Study. R. S. Scorer. *Atm. Environ.* 2, 35-48 (Jan., 1968).

This study was undertaken on behalf of Shellstar Limited in 1966, who planned to build a fertilizer plant on the south side of the Mersey estuary. The chief problems arose from its closeness to the town of Helsby, some of whose houses are on high ground within a mile of the site. There was also the risk of a haze of ammonium compounds of a kind already experienced on Tees-side. From a study of records selected from suitably chosen meteorological office stations and a knowledge of the topography and the behavior of fog and winds in the Merseyside area it was found that in very stable conditions the air drift was away from Helsby and that although the most common wind was from the site toward Helsby this was normally more unstable and fresher than average. The fogs on Merseyside are of a quite different nature from those on Tees-side and no chemical haze problem is expected. The case illustrates the importance of making the correct correlations of meteorological elements because the prima facie implications of long-term averages of individual elements are quite misleading in this case. None of the important problems in this case were soluble by use of dispersion formulae. During the study it became obvious that although there is often a serious reduction in visibility in the south Merseyside area from distant pollution, domestic pollution in Helsby is the worst problem there. Other major sources are the BICC works in Helsby, Incs Power Station, Stanlow Refinery, and road and rail traffic. The traffic was also a substantial source of noise. The new plant would not be a source as bad as any of these.

--APCA Absts.

- 1014 The Double Contact Process For Sulfuric Acid Production. W. Moeller and K. Winkler. *J. Air Poll. Control Assn.* 18, 324-325 (May, 1968).

In the usual contact plants 97-98% of the SO_2 is oxidized to SO_3 while the remaining 2-3% nonoxidized SO_2 are emitted. The stack gas generally contains 0.2-0.3% by volume SO_2 . Through changing to the Bayer Double Contact process, the conversion can be raised to 99.5% or higher. The sulfuric acid can be produced at the same cost as with the single contact method, since the additional capital investment is compensated by higher yield and throughput (this applies to Germany). Based on equilibrium considerations, the rates of conversion obtainable with the contact and double contact processes are shown. The theoretical results are compared with the values obtained in practical operations. The fundamentals of the process are explained and the experience so far accumulated is discussed. The first double contact plant was started up in March, 1964. By the end of 1966 as many as sixteen double contact plants were in operation and a further ten will go into production during 1967. These plants use sulfur, pyrite, zinc sulfide, or sulfates as raw materials. One reference is given.

--Authors' abst.

- 1015 The Diesel Engine and Atmospheric Pollution. H. E. Styles, J. Vrebos, and P. J. Lawther. *World Health Organ. Chron. (Geneva)* 21, 201-206 (May, 1967).

According to this review (based on report WHO/AP/67/28), the actual contribution of the diesel engine to air pollution is a relatively minor one and could be controlled with little difficulty and at small cost by appropriate selection of engine power and by the proper calibration, maintenance, and overhaul of fuel pumps and injectors. No excess of lung cancer or chronic bronchitis has been demonstrated in groups occupationally exposed to high levels of vehicular exhaust. A usual method of investigation is that involving detailed analysis of materials from engine exhausts under controlled, defined operating conditions. This method should be supplemented by accurate measurements of the levels of specific pollutants in the ambient air. Motor vehicle exhausts are regarded as very minor sources of atmospheric pollution compared with the inefficient combustion of coal. The odor of diesel exhausts is frequently objectionable, but the chemical nature of the offending substances is unknown. Diesel engines that emit needless amounts of smoke are either underpowered or overloaded, and in either case are being overfueled.

--APCA Absts.

- 1016 Hazards in Diesel Smoke. B. P. Sinha and S. Pande.
J. Indian Med. Assn. 49, 330-332 (Oct., 1967).

Four mongrel dogs were fed standard meals and subjected for 15 min. daily to the combustion products (concentration not estimated) of diesel fuel in a wooden chamber for 5-8 weeks or until death. The diesel fuel previously had been sprayed and burned in the air inside the exposure chamber. After 2 weeks, they developed anorexia, dermatitis, conjunctivitis, scleritis, ulcerations, generalized wasting, dullness, tonic and clonic convulsions, emphysema, liver changes, and pulmonary edema. Three died. The results are compared with others reported elsewhere.

--APCA Absts.

- 1017 Influence of Fuel Properties and Effect of Antismoke Additives on Diesel Exhaust Smoke. G. McConnell, et al. SAE J. 76, 36-46 (March, 1968).

Smoke is the predominant characteristic of diesel exhaust. The effect of a change in fuel cetane number or volatility on smoking is unpredictable. Changing either the mode of operation or the engine design may be a better way to improve smoking in the diesel exhaust. Anti-smoke additives on the other hand, particularly barium-treated additives, have reduced diesel smoke significantly.

--APCA Absts.

- 1018 Benzo(a)pyrene in Gasoline Partially Persists in Automobile Exhaust. C. R. Begeman and J. M. Colucci. Science 161, 271 (July 19, 1968).

On average 36 percent of the benzo(a)pyrene in an automobile's exhaust gas comes from the benzo(a)pyrene originally in the gasoline. Between 0.1 and 0.2 percent of the benzo(a)pyrene in the gasoline survives the combustion process and is recovered from the exhaust; 5 percent accumulates in the crankcase oil. Some of the benzo(a)pyrene in the gasoline is converted into other polynuclear aromatic hydrocarbons and other more polar compounds. For our experiments we used commercial gasoline containing benzo(a)pyrene at 1.0 part per million to which was added benzo(a)pyrene-8, 9-¹⁴C at 1.1 parts per million as a radioactive tracer. There are 6 references.

--Authors' abst.

ACCIDENTS AND PREVENTION

- 1019 Mesentery and Bowel Injury From Automotive Seat Belts. C. L. Witte.
Ann. Surg. 167, 486 (1968).

In reporting five cases of ruptured intestine and/or laceration of intestinal mesentery caused by acute frontal deceleration against lap seat belts, it is suggested that further improvements in the design of seat belts should be developed. The impact force in a head-on collision is estimated at about 2000 pounds, and experimental work shows that the sudden application of 8 pounds raises internal jejunal pressure to 300 mm. Hg. the level beyond which small intestine ruptures. The small bowel characteristically ruptures on the antimesenteric border in a length-wise direction. Gastric and colonic perforations are uncommon. The forward acceleration of the upper torso with a constrained pelvis may also cause the lap seat belt to act as a fulcrum for acute flexion of the trunk. A shoulder harness may prevent this as well as the facial and head injuries caused by the head striking the dashboard. The standard seat belt does keep the victim in the car and thus undoubtedly reduces the severity of the injuries, but there are injuries attributed to its use. Further modification of seat belt design is needed.

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

- 1020 Wringer Injuries in Children. J. E. Allen, A. R. Beck, and T. C. Jewett, Jr.
Arch. Surg. 97, 194-197 (Aug., 1968).

01 132 3878

The majority of the patients with wringer injuries come from lower economic groups where this type of washing machine is usually used and where parental supervision may be less rigid. Friction and compression forces cause a variety of tissue damage. With a uniform program of hospital admission, bulky compression dressings, constant elevation, and close observation, 93% of 115 patients had no lasting sequelae from their injuries. Public education on the hazards of a wringer washing machine, better safety features, and closer supervision of the child would help prevent such injuries.

--J. Am. Med. Assn. References & Reviews

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