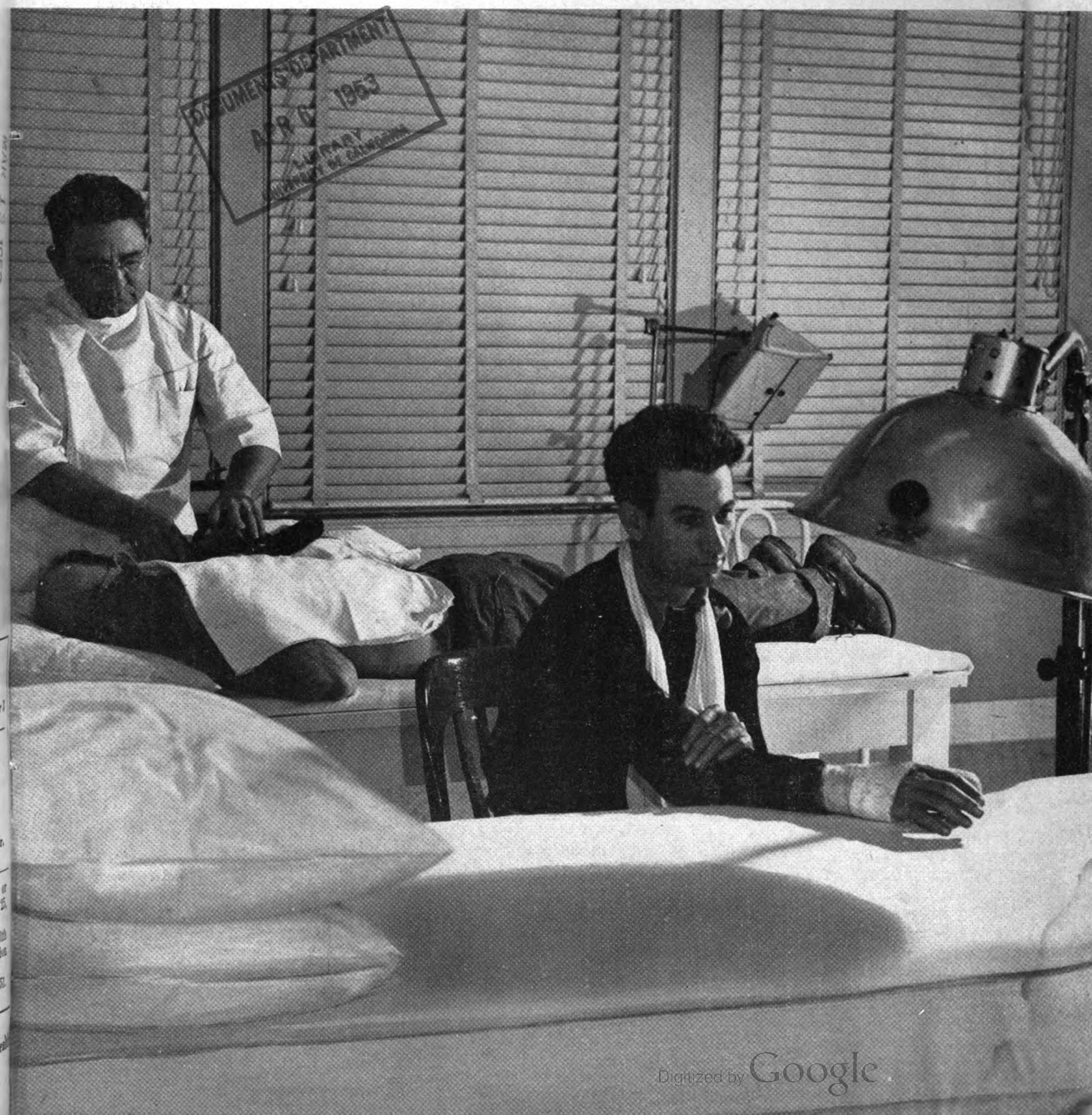
# occupational health



**APRIL 1953**

*FEDERAL SECURITY AGENCY • Public Health Service*



# Buildings Used 45 Years for Radium Research Surveyed by Baltimore Industrial Hygienists and USPHS Staff

WHEN the Kelly Clinic of Baltimore announced it was going out of business, the City Health Department requested the privilege of surveying the buildings for health hazards.

The clinic, founded by Dr. Howard A. Kelly in 1904, has used the same buildings continuously for 45 years for extensive work with radium and X-ray in relation to cancer therapy. Believing that the buildings may be dangerously contaminated by the radioactive materials, the City Health Department requested the assistance of the U. S. Public Health Service to make a study of the buildings and the personnel.

Aside from the potential health hazards that may be involved, the closing of the Clinic has other interesting aspects. Quoting from the January 8, 1953, issue of the Baltimore paper, *The Evening Sun*, the account reads:

"A stroke of fate, abetted by the thrift of a physician, once resulted in a striking contribution to atomic science by Baltimore's Kelly Clinic, which closed its doors last week.

"The contribution was the world's largest supply of polonium, at a time when polonium was very scarce, and it was used to bombard the atom, and split it, in Lord Rutherford's Cambridge University laboratory 20 years ago.

"The polonium was collected by Dr. Fred West, just because he couldn't bear to throw it away. 'I thought,' he recalls, 'that someone might some day want it for research.' And sure enough, someone did.

"The polonium was a byproduct of the clinic's therapeutic process. The institution's radium, stored in an insulated vault, emitted radium gas, or radon, which had to be pumped off regularly and which was used to treat patients.

"It was used after being run through a glass instrument, a condensation plant which removed impurities by freezing them behind liquid nitrogen. The radon, which did not freeze, was forced, by the use of a complicated system of mercury pumps, to the bulb of a small glass bead. When the gas was in the bead, the bulb was sealed off with a flame and removed.

"It was then placed in a brass cartridge and used to treat certain types of cancer—chiefly skin cancer and malignancies of the uterus. The radon in the bead was good for a short time. Then it turned into radium D, which disintegrates into polonium.

"Starting in 1918, Dr. West began saving the discarded beads, storing away some 700 millicuries a day. By 1932 he had a quart of beads containing a comparatively large amount of polonium. No one else had that much. And polonium was suddenly very useful.

"It was useful to Lord Rutherford, the great pioneer in atom smashing who, by bombarding nitrogen with alpha particles emitted by radium, had transformed it into an isotope of oxygen, thus realizing the ancient dream of changing one chemical element into another.

"In the early 1930's a colleague of Rutherford's student, James Chadwick, came to Baltimore to work at Johns Hopkins University. Chadwick was on the verge of his great discovery of the neutron.

"He needed polonium, and Dr. West, learning of his need, offered the quart jar. It was gratefully accepted, taken back to Cambridge, and used in the conclusive atom-splitting experiments there. It worked by emitting alpha and beta rays.

"The clinic opened 45 years ago when Dr. Howard R. Kelly became interested in the development of radium as a tool against cancer. Dr. Kelly got his first radium from the Curies. Later, he acquired it in Austria.

"By 1918 he had five grams, then the world's largest supply. In the early years of the Clinic, workers had small understanding of the dangers of working with radium, and some were injured. Two died."

When the study of the premises and personnel is completed, a report will be made in this publication.

# J. C. Soet, First Speaker on ACGIH Program in April

SPEAKING on the training of industrial hygiene personnel, J. C. Soet of the Bureau of Industrial Health, Michigan Department of Health, will lead off in the annual meeting of the American Conference of Governmental Industrial Hygienists. This year the Industrial Health Conference will be held in Los Angeles, California, the week of April 18 to 25.

Following Mr. Soet on the program is Mr. Jack C. Rogers, director of the Division of Industrial Health, Los Angeles Health Department, who is speaking on "Industrial Hygiene Operations in a Metropolitan Area."

John K. Williams, Executive Secretary of the Industrial Health Council for Birmingham, Ala., will explain the activities of the Council.

Henry N. Doyle of the Division of Occupational Health, U. S. Public Health Service, will conclude the formal program the morning of April 20 with a talk on "Occupational Disease Reporting Practices and Incidence." A business meeting will be held immediately after.

Monday afternoon, J. J. Bloomfield of the Institute of Inter-American Affairs, Lima, Peru, will speak on "Industrial Hygiene Developments South of the Border."

Tuesday morning, April 21, the American Industrial Hygiene Association will meet jointly with the ACGIH to hear the following papers: "An Investigation of the Occurrence of Non-Equilibrium Atmospheric Mixtures of Radon and Its Daughters" by E. C. Tsivoglou, H. E. Ayer, and D. A. Holaday; "Emanation of Radon in Uranium Mines and Its Control by Ventilation" by E. C. Tsivoglou and H. E. Ayer; and "The Occurrence of Radon in Non-Uranium Mines in Colorado" by P. W. Jacoe. Mr.

**(Continued on page 64)**

# Dale Cameron, PHS Physician, Leads Discussion on Workers' Mental Health

A "Clinic on Human Relations and Occupational Health," with Dr. Dale C. Cameron serving as chairman, was one of the features of the annual Congress on Industrial Health, American Medical Association. Dr. Cameron is chief of the program development branch, Division of Occupational Health, Public Health Service.

A 35-minute dramatic presentation depicting an industrial counseling problem provided the substance for the morning's discussion. Presented by members of the counseling staff from the Hawthorne plant of Western Electric Co., four scenes were shown to illustrate the following: (1) The recognition of an employee's emotional problem by his foreman and referral to a counselor; (2 and 3) interviews between the counselor and the employee who had a marital problem: and (4) a discussion between the counselor, employee and foreman after the completion of therapy.

Following this presentation, the members of the audience were divided into four groups for a discussion of this situation in relation to their own plant problems, such as, methods of providing counseling service, the relation of such problems to the medical department, and the responsibility of management for service to employees with "non-occupational" problems of this type. After the group discussions, which lasted 1 hour, the audience returned to the main room where a panel reviewed the opinions of the various discussion groups. This panel was chaired by Dr. Walter D. Woodward, psychiatric consultant of the American Cyanamid Co. The members were preselected from the various discussion groups. At the conclusion of the panel discussion, which lasted about three-quarters of an hour and involved participation from the floor, Dr. Cameron summarized the views expressed during the afternoon.

Dale C. Cameron, M. D.

It was the consensus that attitudes do affect the productivity of workers, that there is a relation between the job and home problems which is of concern to management, that a formal mechanism is needed within industry to deal with the emotional problems of workers, and that this mechanism desirably should take account of the interests of the employee, supervisor, personnel and medical departments, and top management. It was further brought out that a physician can learn more about his patient in a given period of time by quiet and attentive listening than he can by delivering a monologue in the form of questions which usually are so put as to suggest their own answers.

The attitude of the physician or counselor must be reassuring and uncritical. It should be recognized that the patient is likely to be both fearful and hostile, and thus the therapist must be prepared to accept and deal with hostility, rejection, criticism and not infrequently overaffection.

Industry tends to think of its employees as men who operate machines, men who have accidents, men who have special skills, absent men, but all too infrequently about employees as human beings. In dealing with human beings one must be aware of the fact that all individuals have certain basic needs or wants and that some of these are related to the work situation. For example, the employee usually wishes to know what is expected of him, what his place is in the organization, and he usually desires recognition of status in relation to his skill, seniority and experience. Further, one must know something about how each individual can satisfy these basic needs. The individual who takes account of these factors in his daily contacts with his fellowmen and realizes that how he does a thing is often as important as what he does is the individual whose behavior usually bears the stamp of good human relations.

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# Alcohol Study Center Plans July Seminar

The director of the Yale Center of Alcohol Studies has announced that a 5-day training course for business and industrial personnel will be held at Yale University July 27 through July 31, 1953.

The sessions will be conducted to acquaint representatives of business and industry with the nature of problem drinking in industry, with policies of treatment, retirement and separation, with procedures and resources for treatment, and with programs of education and prevention. The course will consist of lectures and seminar groups led by a staff from the Yale Center and by industrialists with experience in meeting these problems.

The course is open to representatives of business, industry and labor who are engaged in industrial health, personnel work, industrial relations or related activity.

Requests for further information should be addressed to Selden D. Bacon, Director, Center of Alcohol Studies, Yale University, 52 Hillhouse Avenue, New Haven, Conn.

## Safe Use of Silver Cleaners Containing Thiourea Questioned

By H. E. Stokinger

A GROUP of recently developed silver cleaners of the dip-type for household use is currently causing considerable interest among toxicologists. Many of them require no more than a few seconds' dipping in the cleaner followed by washing in warm water to remove the tarnish. The controversial point in many of these cleaners is their thiourea content.

Some publications have labeled this substance "highly dangerous" and "highly poisonous." Competing manufacturers, making different types of cleaners, have been quick to seize on this apparent defect to require stricter regulation and control of the product that ranges from precautionary labeling to outright banning. The York Research Corporation, Stamford, Connecticut, working for the American Hotel Association, is testing and has approved a dozen or more of these silver cleaners, among them the dip-type, thiourea-containing preparations (*1*).

These testers have excluded the cyanide-containing cleaners as too dangerous for public use, excluded others on the basis of too much silver waste, but have passed the thiourea type on the basis of efficiency and minimum of silver attack.

Can these opposing views be reconciled? Are these cleaners too hazardous for use, or are they tolerably safe? This aspect is important because the York-approved preparations have the backing of a *Readers Digest* article as well as the support of the American Hotel Association, which carries considerable influence with the housewife.

The question is difficult to resolve categorically. Thiourea, toxicologically speaking, is almost unique. It has an unbelievable spread in lethal dosage. Injected in oil it has an LD50 range of from 4 milligrams to 1.83 grams per kilogram depending on the strain of animal (rat), age, diet and other factors (*2*) Some workers have reported parenteral lethal doses as low as 1.25 mg/kg for the rat. Age appears to be the major determinant of dosage spread. Suckling rats are reported to be able to withstand 7 grams per kilogram; some of the parents died at 64 milligrams per kilogram. Orally the dose has been reported as high as 10 g/kg (*3*).

Consequently, predictions as to the household hazard from thiourea-containing cleaners are difficult to make. If rat data are taken as indicative, one would assume the preparations not lethal for young children, should they accidentally consume a pint of the preparation. But such deductions are risk-fraught. Then too, although thiourea has been used in doses of 2 grams per day as an antithyroid drug for the treatment of hyperactive thyroids in adults, when raised to 3 grams per day, the drug was not well tolerated. From this, one would conclude that an adult was able to tolerate at least a dose of 300 mg/kg daily for considerable periods.

On the other hand, thiourea is not the sole constituent of these preparations. Some contain a small percentage of a mineral acid, a few tenths percent of a surface-active agent, and a stabilizer in a few hundredths percent. All these substances may complicate the toxicity picture especially in view of the fact that thiourea toxicity, as has been shown, is more profoundly influenced than most substances by other factors.

Consideration of the toxicity of the other factors separately, however, indicates that thiourea is the agent of greatest concern toxicologically both from the standpoint of quantity (6–7 percent cleaner content) and from inherent toxicity. Such cleaners should certainly bear the label "Warning—keep out of reach of children. Not to be taken internally." Certainly no encouragement should be given to careless handling as might be inferred from some advertising statements: "Not harmful if taken internally."

The amount of toxic agents adsorbed on the surface of silverware eating utensils is probably not of concern provided that thorough washing of the ware is carried out as directed and dipping is done infrequently.

*Author's Note:* Thiourea, the diamide of thiocarbonic acid $(NH_2)_2CS$, is made by heating ammonium thiocyanate, $NH_4CNS$, or by the action of hydrogen sulfide on cyanamide $CNNH_2$. Thiourea or its derivatives are used in the rubber industry, photography, and in pharmaceuticals.

**Dr. Stokinger, chief toxicologist, the Division of Occupational Health Field Headquarters, U. S. Public Health Service, 1014 Broadway, Cincinnati 2, Ohio.**

### REFERENCES

(*1*) *Chem. Week. 72:* 48 (Jan. 3) 1953.

(*2*) Dieke, S. H., and Richter, C. P.: Acute toxicity of thiourea to rats. *Jr. Phar., 83:* 195 (1945).

(*3*) Flinn, F. B., and Geary, J. M.: *Contrib. Boyce Thompson Inst., 11:* 241 (1940).

## Michigan Needs Two Engineers

The Michigan Department of Health, Division of Industrial Health, has openings for two Industrial Health Engineers III; salary range $5,424–$6,576; minimum Civil Service requirements: graduation from accredited college in chemical, mechanical, electrical or electronic engineering plus 2 years of experience in industrial health engineering. All applications should be sent to John C. Soet, Acting Director, Division of Industrial Health, Michigan Department of Health, Old Dewitt Road, Lansing 4, Mich.

### *Your Cooperation Is Requested*

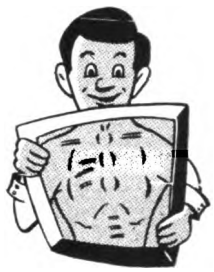
**A random sampling of *Occupational Health* readers received during March a list of questions about the personal usefulness of the publication. If those of you who received it will thoughtfully and honestly answer the questions, it will be possible to make succeeding issues come closer to serving your needs more adequately.**

**To get truly representative opinions, we need to have all the questionnaires answered and returned. We shall appreciate your cooperation in helping us to make this publication more useful to you.—Catherine W. Beauchamp, Editor.**

# Values of Periodic Health Examinations

By J. Howard Johnston, M. D.

PERIODIC health examinations are routinely performed in many large industrial plants. This is as it should be, for a healthy industrial population is invaluable to the preservation of our economic standard and the maintenance of the unparalleled productive capacity of the United States for civilian and military consumption. Large corporations have recognized the importance of a well-integrated medical program and have found it economically sound in today's competitive market. Unfortunately, small industries, which employ by far the greater number of people, do not all carry on such programs.



### *Periodic Examination*

A periodic examination is part of a medical program which is initiated by preplacement examination. The preplacement examination should be a selective one which assumes the compatibility of the worker and his job and not one of limited medical investigation determining only obvious medical defects. Mental or physical difficulties discovered during the preplacement examination are investigated and discussed and remediable defects are referred to the family physician for correction. This high standard of health and safe placement is maintained by the periodic recheck and the associated program of occupational disease prevention carried on in the medical and safety departments.

The examining physician should have an intimate knowledge of the processes and procedures in the operation of the plant for a constructive program in the prevention of occupational disease. He should be aware of all changes in methods, techniques, and chemical compounds so that he may perform an intelligent examination in regard to the hazards associated with the man's working environment. Beyond this, he should be acutely aware of the importance of psychological and social factors in the development of medical disorders.

The complexities of modern life and the continuous struggle of man for security, associated with his dependence on large corporations, may develop or contribute to a feeling of anxiety and insecurity which often finds expression as vague medical complaints. As companies and corporations grow and develop, falter or regress, or maintain a status quo, so may the individual. A periodic reappraisement of individuals, their mental and physical capabilities and job capacities, is essential in this rapidly changing world.

### *Nonoccupational Illnesses*

It should be understood that the findings of the routine physical examination should be referred to the employee's personal physician for control of these conditions. One cannot review the work history alone without considering the home activities if complete evaluation is to be obtained.

As one can readily appreciate, early discovery among large segments of working people of such diseases as tuberculosis, diabetes, syphilis, and defects that may be correctable can have tremendous impact on public health. Further, to develop a healthy industrial population, education in simple medical principles and concepts of disease will go far to promote better health and dispel superstition and ignorant beliefs.

With an aging population, the early detection of chronic degenerative disease found in the older worker will preserve the employee's physical capacity so that his skills and experience can be retained for industry despite advanced age or handicaps.

There are numerous specific reasons why periodic physical examinations are done, such as to determine any ill effects from exposure to dust, fumes, mists, gases, and vapors of metals and solvents, as well as to noise, radiation, heat, and other physical factors in the occupational environment. These examinations serve, too, as special follow-up after selective placement of medically handicapped persons. They may be given also to promote safety, especially among operators of motor equipment, and for obvious reasons to food handlers.

### *Exposure to Toxic Materials*

Occupational disease is now compensable under the statutes of the majority of the States. Although the industrial environment is investigated for concentrations over the maximum allowable concentration of toxic materials, it behooves the industrial physician in his periodic examination to investigate thoroughly those men engaged in occupations where there is a potentially toxic hazard.

Reliance should not be placed on engineering control alone. The reason for this is twofold. The establishment of many of the maximum allowable concentrations of dusts, fumes, gases, and mists is a relatively recent development and is subject to revision from time to time as new information is correlated with existing facts. Further, there is the possibility of individual susceptibility and idiosyncrasy with reference to toxic materials. One employee may react violently to small amounts of a compound which has given little or no trouble to other workers in the same area.

For workers in dusty trades, examination of the respiratory tract for signs of irritation is one of the principal parts of a periodic examination. Exposure to dust containing an appreciable percentage of free silica is particularly hazardous. The severity of the hazard increases with the percentage of free silica contained in the airborne dust and with the percentage of silica particles which are sufficiently small to permit penetration of the finer branches of the respiratory tree.

It is therefore necessary that the free silica content of dust be determined so that the hazard may be accurately evaluated. Where silica is involved, routine chest X-ray examination is mandatory as a safeguard against changes in the lung fields. During this periodic recheck, the value of protective

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equipment such as respirators should be reemphasized to the worker so that he thoroughly understands the reason for wearing protective equipment.

Beryllium and asbestos are other toxic materials which may produce changes in the lungs, and physical examination without chest X-ray may give little indication of pathologic change. Beryllium is excreted in the urine and can be detected through urinary analysis.

Still other materials that may affect the respiratory tract are acid and alkaline mists, nitrous fumes, formaldehyde, sulfur dioxide, and ammonia. Some fumes, gases, and vapors, although they produce no effect on the lungs, will be absorbed through the respiratory tract and cause trouble in other parts of the body. Lead fumes, lead dust, mercury vapor, manganese fumes, and the vapors of benzene and its analogues, and the chlorinated hydrocarbons are examples of these.

Where a potential lead hazard exists, periodic checks should include examination of blood cells, gastrointestinal tract, and central and peripheral nervous system. Concentration of lead in the blood and urine should also be determined.

With exposure to such substances as mercury, manganese, and carbon disulfide, effects on the central nervous system should be searched for. Solvent vapors from benzene and its analogues and the chlorinated hydrocarbons vary considerably in their toxicity. Benzene in sufficient concentrations will affect the bone marrow. Routine blood count, as well as a determination of organic and inorganic urinary sulfate levels, serves to prevent such an occurrence.

Carbon tetrachloride is one of the more toxic chlorinated hydrocarbons, and will affect the kidneys or liver if adequate precautions are not taken and periodic checks are not performed.

Physical factors in the worker's environment have been receiving increasing attention of late due to the rising number of compensation claims. Where noise is a factor, audiometric examination should be routinely performed. Similarly, the effects on the industrial worker of radiation from the industrial use of radioisotopes, X-ray, and fluoroscopes should be routinely checked to prevent any adverse condition from developing.

***Physically Handicapped***

Those individuals who were hired with some physical defects should not be forgotten once the preplacement physical examination is over. Aggravation of an existing defect is compensable. To prevent such a development, continuous reappraisal of the individual and the job specification is necessary. Actually these men, when well placed, rarely give cause for medical concern. Furthermore, their absentee and safety records compare favorably with those of the other workers. Men with hidden, undiscovered handicaps, however, may jeopardize their health and that of others.

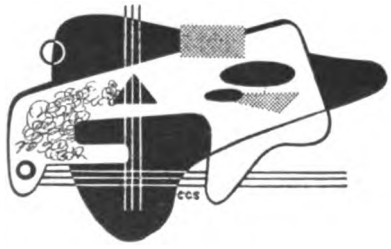
***Individual Responsibilities***

Examination is essential of individuals having special responsibilities which may involve the safety of others. Drivers of motor equipment, crane operators, truck drivers, and others should be screened for poor vision and, as is presently possible, to uncover latent coronary artery disease and other conditions that might produce physical catastrophes. Food handlers should be periodically examined for evidence of communicable disease.

***Prevention and Maintenance***

The periodic examination should be extended to all employees, thereby providing an essential part of a good program designed to maintain a healthy industrial population. In these times of expanding industry, a replacement for a highly skilled, trained worker lost by illness is not easily found.

The value of the periodic examination, therefore, is in maintaining health through prevention of occupational disease, through safe placement, and through watchfulness for other factors that may influence health. Lowered absenteeism, lowered compensation cost, less labor turnover, and better health for workers will result.



## Guinea Pigs Thrive on Home Grown Bean Sprouts

IN the animal rooms of the laboratories of the Division of Occupational Health at Cincinnati, Ohio, one will see a number of trays of beans sprouting. Visitors touring the laboratories usually raise an eyebrow and inquire about this experiment. The explanation is simple. We have found it advantageous to raise our own green food supplement for guinea pigs.

Twice each week, mung beans, such as are used in Chinese foods, are prepared for sprouting. The beans are washed twice with water, drained and placed in shallow pans so that the bottom of each pan is barely covered. Water, containing 10 ml. of laundry bleach, is added to just cover the beans. The bleach is necessary to prevent the growth of molds. These pans are then set in a warm, dark place and covered with paper. Water is added as needed during sprouting to keep the beans moist. In 4 or 5 days, the harvest is ready.

Enough sprouts for feeding 40 to 50 guinea pigs can be grown by planting about three-fourths pound of mung beans every 4 days. Since the beans cost only 30 cents per pound, the sprouts are much cheaper than carrots, kale, cabbage, and other green foods. The sprouts can be used directly from the pans or can be stored in a refrigerator. A small handful (about 40 sprouts) per day is enough for one guinea pig. Water and rabbit pellets, ad libitum, make up the balance of the rations.

Weights and litter sizes of three generations of guinea pigs raised on this diet have been compared with those of other pigs fed on kale and various market vegetables. These comparisons have indicated that the sprouts are a satisfactory food supplement.

On the basis of 6 months' experience, it is estimated that there will be an annual saving of $200 from the use of mung bean sprouts. Another advantage is the ready availability of the feed. In addition to the lower cost, there is considerable advantage to the certainty of having a supply of food on hand. The time required for the animal caretaker to plant and harvest the sprouts is almost negligible, probably less than the total time required

for frequent shopping. Besides all this, the guinea pigs like the bean sprouts and apparently thrive on the less costly diet.

Clinton Gray, animal caretaker, who introduced this feeding plan, has received a cash award of $10 as part of the Public Health Service's management improvement program.—**Division of Occupational Health Field Headquarters, U. S. Public Health Service, 1014 Broadway, Cincinnati 2, Ohio.**


English, J. A.: An analysis of the dangers of X-ray irradiation. *Dental Radiol. and Photog., 25:* 1–7 and 20 (1952).

Fowler, P. B. S.: Printers' asthma. *Lancet, 2:* 755–757 (Oct. 18) 1952.

Goldner, M. G., Volk, B. W. and Lazarus, S. S.: The effect of cobaltous chloride on the blood sugar and alpha cells in the pancreatic islets of the rabbit. *Metabolism, 1* (Nov.) 1952.

Greifenstein, F. E., King, R. M., Latch, S. S. and Comroe, J. H., Jr.: Pulmonary function studies in healthy men and women 50 years and older. *J. App. Physiol., 4:* 641 (1952).

Kearne, R. A.: How to present a scientific paper before a large audience. *Ann. Int. Med., 37:* 618 (Sept.) 1952.

LaMer, V. K., and Kerker, Milton: Light scattered by particles. *Scient. American, 188:* 69 (Feb.) 1953.

Morgis, G. G. and Davenport, S. J.: State compensatory provisions for occupational diseases. *Bur. Mines Infor. Circular 7650.* U. S. Dept. of the Interior, Washington, D. C., 1952. ii+125 pp. Processed.

Ritter, V. W., Warren, S. R., Jr. and Pendergrass, E. P.: Roentgen doses during diagnostic procedures. *Radiology, 59:* 238–51 (Aug.) 1952.

Simonson, Ernst and Keys, Ancel: The effect of age and body weight on the electrocardiogram of healthy man. *Circulation, 6* (Nov.) 1951.

Wilkins, G. F.: Important features in the medical program. *New England J. Med., 247:* 465 (Sept. 25) 1952.

# Toxicity of Crotonaldehyde

TOXICITY information on crotonaldehyde has been made this month's selection because of a recent report indicating that this aldehyde may be the causative factor of severe irritation among lettuce handlers. In certain sections of the country, workers who were exposed to the butts of lettuce that had been treated with aldol ($CH_3$–CHOH–$CH_2$–CHO) complained of irritation from its vapor.

When this matter was brought to our attention, it seemed very likely that crotonaldehyde was the offending agent rather than aldol. The reasons for this were three-fold: (1) The greater vapor pressure of crotonaldehyde (see below) is more consistent with effects from vapor exposure than is aldol, (2) the irritating properties of crotonaldehyde are more pronounced than those of aldol and (3) the probability of crotonaldehyde formation from aldol by simple loss of water from the molecule is good when nonalkaline conditions exist.

Accordingly, the remedy suggested was to take steps to maintain the aldol in the lettuce butts at a weakly alkaline range which would stabilize the aldol and prevent its decomposition into crotonaldehyde.

Crotonaldehyde, 2-butenal, crotonic aldehyde, propylene aldehyde, or B–methylacrolein is a colorless, flammable liquid with a sharp, characteristic pungent and irritating odor, freezing at −60° C and boiling at 102.2° C. Its density is $\frac{d\ 20}{20}$ 0.853; index of refraction, $\frac{M\ 17.3}{D}$ 1.4384; and it has a vapor pressure of 30 mm at 20° C. Crotonaldehyde can exist either in the (*cis*) form $\frac{H\text{–}C\text{–}CH_3}{H\text{–}C\text{–}CHO}$ or (*trans*) form $\frac{CH_3\text{–}CH}{H\text{–}C\text{–}CHO}$ but the substance found in commerce has the *trans* configuration.
commerce has the *trans* configuration.

The flash point (open cup) of anhydrous crotonaldehyde is 13° C. Its solubility in water is 18.1 g/100 g at 20° C. Crotonaldehyde slowly oxidizes to crotonic acid in the open air and this oxidative process increases in rate with increased pressure or in the presence of catalysts. As might be inferred from its ethylenic structure and aldehyde group, it is very reactive and will resinify to a dimer readily. It undergoes addition and condensation reactions with alcohols, phenol, aldehydes and ketones, amines, and unsaturated hydrocarbons. It is prepared by adding aldol slowly to a boiling, dilute acid and removing by distillation the crotonaldehyde, which instantly forms.

While the greatest use in the United States for crotonaldehyde is for the manufacture of n-butyl alcohol, it is also used as a solvent in the purification of oils, in the manufacture of quinaldine and other synthetic organic chemicals, and in the manufacture of resins.

Crotonaldehyde has a pronounced lacrimatory action. It is impossible to remain in an atmosphere of any large amount of the vapor of this substance, and prolonged exposure to even low concentrations may result in sensitization. However, no serious disabilities have been reported from exposure to this substance in industry. Smyth and Carpenter (*1*) found the single dose oral toxicity to rats of crotonaldehyde to be 1 gram per kilogram of body weight; and the $LD_{50}$ by skin absorption, using guinea pigs, to be 0.03 ml per kilogram. The maximal exposure of rats to the saturated vapor with no death was 1 minute. Because of its powerful odor and intense lacrimatory effect, crotonaldehyde has been proposed and used as an excellent warning agent in domestic gas for detecting leaks (*2, 3*). It is estimated that a concentration of 1 pound of crotonaldehyde in 1 million cubic feet of gas will awaken a sleeping person.

### Analysis

Owing to its aldehyde structure, crotonaldehyde should present no particular difficulty in determination where it exists as a single atmospheric contaminant. It may be identified in micro amounts by conversion to a hydrazone with *p*-nitrophenylhydrazine (*4*).

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**Adapted by H. E. Stokinger from data compiled on the toxicity of crotonaldehyde by Dr. L. T. Fairhall. Dr. Stokinger is chief toxicologist with the Division of Occupational Health Field Headquarters, U. S. Public Health Service, 1014 Broadway, Cincinnati 2, Ohio. Dr. Fairhall is scientist director (Ret.), USPHS, P. O. Box 92, Pine Orchard, Conn.**

**References**

(*1*) Smyth, Henry F., Jr., and Carpenter, C. P.: The place of the range finding test in the industrial toxicology laboratory. *Jr. Ind. Hyg. and Tox., 26:* 269 (1944).

(*2*) Fieldner, A. C., Sayers, R. R., Yant, W. P., Katz, S. H., Shoham, J. B., and Leitsch, R. D.: *U. S. Bur. Mines Monograph, 4.* 156 (1931).

(*3*) Katz, S. H. and Talbert, E. J.: *U. S. Bur. Mines Tech. Paper 480* (1933).

(*4*) Markovic, D.: Microchemical detection of aldehydes and ketones. *Mikrochemie ver. Microchim. Acta., 32:* 6 (1944).


## Pulmonary Function Tests Aid in Evaluating Pneumoconiosis

**By Charles J. Buhrow, M. D.**

NOWHERE in the field of compensation administration are the difficulties of determining injury to health from occupation greater than in cases involving lung disease caused by the inhalation of dust, otherwise known as pneumoconiosis. These difficulties result largely from the vagueness and incompleteness of compensation laws, which in turn reflect the confusion which has prevailed in defining and evaluating disability in pneumoconiosis.

In recent years, as a result of the work of Cournand, Wright, Motley, and others, the testing of pulmonary function has become a highly developed specialty. Pulmonary function tests, though not without their shortcomings, are an important addition to the methods used in determining disability from dust diseases of the lungs and it can safely be predicted that they will find increasing practical applications. The chest X-ray, despite the dramatic and striking changes it reveals in pneumoconiosis, is usually a poor indicator of the degree of loss of pulmonary function.

If adequate facilities and trained personnel were available to carry out thorough function studies on the bulk of pneumoconiosis cases considered for compensation, many problems concerning disposition of these cases would be resolved. Unfortunately, however, there are only a few laboratories properly equipped and staffed to carry out this work, and not many of these are located in areas where heavy exposure to occupational dusts, as in mining operations, occurs. This is particularly true of sparsely settled areas of the West.

This lack of laboratory facilities is understandable when one considers the dearth of medical personnel who have acquired the specialized training and knowledge necessary to set up and operate a pulmonary function laboratory. With the mounting interest being shown in these techniques the situation will definitely improve, but to hasten the process there is a need for placing more emphasis in the medical school curriculum on industrial lung diseases and their evaluation, and for continuing research on the development of simple and reliable testing methods.


**Drs. Buhrow and Birmingham are physicians with the Occupational Health Field Headquarters, 1014 Broadway, Cincinnati 2, Ohio.**


## Shale Oil Workers Receive Periodic Examinations

**By D. J. Birmingham, M. D.**

IN July of 1952, the Division of Occupational Health began a medical study of workers of the United States Bureau of Mines Oil-Shale Demonstration Plant in Rifle, Colo. This was the first of a series of periodic clinical examinations which are to be performed by the Division at this plant which has been operating and producing liquid fuel since 1947.

The source of the liquid fuel is a sedimentary rock containing organic matter which, under heat and pressure, yields crude shale oil. In this section of Colorado, approximately 640,000 acres of shale rock were laid down 40 million years ago, during the Cenozoic Age.

Commercial shale oil is by no means a new substance. It was produced in France about 1830 and in Scotland about 1850. For many years the shale oil as used in Scotland and England was authentically described by both dermatologists and other physicians as capable of producing a carcinoma of the skin, commonly termed "mule spinner's cancer."

Because some private companies may soon embark on the commercial production of oil from shale, the United States Public Health Service was requested to investigate this industry to disclose any existing health hazards, notably those involving cancer of the skin.

Although the clinical phase of this study includes a general physical examination, it must concern itself particularly with the presence of any and all skin lesions. When indicated, suspicious lesions have been, and will continue to be, removed and studied to determine whether there are neoplastic changes of benign, precancerous, or malignant nature in the skin.

Particular emphasis must also be placed on the age, complexion, and texture of the skin as related to the amount of exposure to sunlight in the Colorado area where ultraviolet radiation is relatively intense and is known to be able to produce neoplastic changes in the skin.

At this time the clinicians are unable to estimate exactly how long such individuals will be observed. In all likelihood, the period of observation will be at least 5 years. At the end of this time, conclusions may be reached on the following: (1) The neoplastic effects of American shale oil upon the skin of these workmen, and (2) the role which good industrial hygiene will play in preventing the occurrence of such lesions.

Within the near future an engineering study will be made to learn more about the manufacturing processes, to analyze the various gradations of exposure, and to recommend appropriate engineering changes which will diminish exposure to shale oil, its vapors and mists.

## IIAA Publications Available Free

A limited number of copies of J. J. Bloomfield's reports entitled *Industrial Hygiene Problems in Peru* and *Industrial Hygiene Problems in Chile* are available free to libraries and other organizations or persons interested. To request copies, address The Institute of Inter-American Affairs, 333 Third Street NW., Washington 25, D. C.

# Health Education in Industry

By Margaret Hart, R. N.

OBSERVATION of recurring health needs within an industry, study of the general health needs in the community, and a knowledge and understanding of means of fulfilling those needs will help to provide a basis for health teaching as a part of nursing in industry.

Health has been defined in a variety of ways, but the definition proposed by the World Health Organization provides a good foundation for the development of health education in industry. It states that health is "* * * a state of complete physical, mental, and social well-being, not merely the absence of disease or infirmity * * * which makes possible the highest quality of effective living and of service." Two things become evident when we study this definition. First, health is to be protected and preserved for a reason—effective living and service. Second, the definition has to do with the potentialities of each individual, rather than comparison of one individual with others. The complexity of assessing individual abilities, interests, and motives must be considered by the nurse in industry, if she is to be effective in her health teaching.

The purpose of health education includes promotion of health and safety and preparation for healthful living. It becomes abundantly clear that in our society, which fosters individual freedom and individual responsibility commensurate with that freedom, this purpose must be achieved through the development of self-direction. This must be kept in mind in the planning, carrying out, and evaluation of health teaching in industry.

### *Family Health*

We know that the good health of the family has a very important influence upon the general welfare. For example, the good health of the mother serves as a protection to the children. The good health of the father improves his opportunity for continuous employment, eliminates the high cost of sickness and helps to insure better living conditions for the family. Worry over other members of the family is reflected in the work of those employed in industry. The industrial nurse soon finds that her interest must extend beyond the plant itself, if she is to understand some of the real causes of sickness, accident and absence from work.

### *Personal Interviews*

How does health education in industry come about? This depends in part upon the time that is available. In some industries health education has become a vital part of the program. It receives special consideration and time is set aside in the working day for lectures, group discussions, and the like. In other industries no such provision is made. Be that as it may, health education is an integral part of the nurse's work. Many opportunities to teach arise in her interviews with individuals and groups; and visual materials, such as posters and literature, may be used to strengthen her teaching. In planning health education, she uses every opportunity to promote interest and active participation throughout the industry.

Although, in the majority of industries, the nurse will probably find that her greatest opportunity for health education lies in individual teaching, this does not mean that group work should be overlooked. Some problems are tackled in a much more effective way by groups than by separate individuals, especially if the group represents a variety of points of view.

### *Group Teaching*

Who needs health education? The whole industry is involved in some parts of the health program and health education becomes very important in relation to the policies of the industry. For example, the chest X-ray survey may be used to develop understanding and self-direction. If a survey is to include the entire industry, there will be a big job to do before the survey begins.

Careful explanation and preparation should be made so that individuals and groups will have time to consider the purpose of the survey, the significance of early diagnosis, care, and treatment of tuberculosis, community responsibility in maintaining adequate resources for prevention and treatment of tuberculosis, and many other questions which may arise to require thoughtful consideration. Effective control of this disease depends upon the sustained interest of the community. The attitude toward the disease and the acceptance of individual responsibility are important.

### *Self-direction*

The nurse in industry will find many opportunities to influence the development of constructive attitudes which, in turn, help people toward wiser self-direction. This cannot be achieved in a day; it happens little by little and depends to a large extent upon the skill of the nurse in helping others to make their own decisions. They may need further information, or an opportunity to talk things over. They may be confused by hearsay and the premature publicity given to new and untried drugs and treatments.

The nurse must be aware of what is happening in the field of research and experimental work and she must know the significance of what the general public is reading in popular magazines, if she is to help clarify thinking and overcome major misconceptions. This is but one example of the opportunity for health education in industry.

In addition to health policies which may be instituted for the whole industry, there may be groups within an industry who have special needs. For example, special hazards may be found in particular departments. The awareness of these hazards may not serve to create safety for the employee. He may even become less concerned about the hazards as he becomes more familiar with the work. This presents one of the most important challenges to the nurse in industry.

### *Safety Thinking*

Self-direction is of utmost importance in the promotion of safety. Rules and

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penalties create a negative influence which in themselves cannot guarantee safety. The group involved in the hazardous process must find ways of promoting safety. Individual behavior is chiefly concerned; motivation then becomes basic and this depends upon an analysis of feelings and attitudes in addition to understanding of the requirements for safety.

The rules may grow out of group thinking and discussion, and the observance of these rules will depend upon their acceptance by members of the group and the group as a whole. In other words, there would result greater individual responsibility and greater group responsibility. Members of the group would help each other to abide by safety regulations throughout the working period.

Health conditions found among employees provide further opportunity for individual and group teaching. Special age groups may present special hazards which require particular care on the part of the nurse in order that adequate means of protection may be observed. The executive group may have special needs in relation to health as well as to the more thorough understanding of the relationship between health of the employee and production.

***Help From Foremen***

Foremen are in a position to observe early signs of illness because they are so well acquainted with the individual employees in their groups. If we are to achieve the purposes of a health service, it will be increasingly necessary to discover incipient illness as early as possible. Like the teacher in the classroom, the foreman is able to see any slight deviation in behavior which may indicate the very early stage of illness. Without the foreman's help, this might be overlooked until it interfered with the employee's ability to work.

Committees with special responsibilities relating to health and safety may present special problems which the nurse in industry can help to tackle. The nurse's understanding of human needs and behavior, community and social customs, will help her to work effectively with other members of such committees. She may find resources in her community which she can use to develop this understanding and skill, or she may have to depend to a very large extent upon her own reading and study.

Health programs that are going on in the local community and over the country as a whole, may give direction to the health education program from time to time. To name only a few—cancer, safety, and immunization are particularly important to the industrial worker and his family. Teaching should be continuous, but special focus upon particular topics from time to time will serve to add variety and strengthen the day by day program.

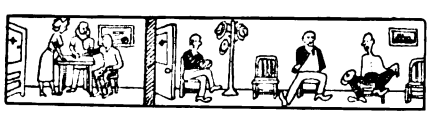
***Professional Study***

How will the industrial nurse prepare herself for health education? Reading is the most universal way in which the industrial nurse can maintain her awareness of developments in nursing, health, medicine, and related fields which affect her services. Keeping in close touch with other nurses in the hospital and public health field will enable the industrial nurse to follow through on service for patients.

Discussion and comparison of experiences will often help the industrial nurse to evaluate her own work and make improvements. This is particularly true if the nurse is working alone. There may be resources within the community which are readily available to the industrial nurse and can be used in developing a program for the nursing professional group. Regular courses in the university and other institutions may be attended.

***Human Relations***

It has become increasingly important for human beings to learn how to get along together in harmony and understanding; to try to accept the other person's reactions and attitudes in an attempt to reach a common agreement. This has meaning for the industrial nurse in her efforts to promote health education. She must take account of attitudes, understand their significance, and find ways to impel people to pursue a healthful way of living. Theodore Roosevelt once said, "The best prize which life offers is a chance to work hard at work worth doing." This is a basic tenet of health and happiness.



## Massachusetts Nurses Urged to Use Test for Lead

The problem of lead poisoning is a constant one in Massachusetts, and for this reason new and improved methods of detecting early signs and symptoms of lead poisoning among workers is an important challenge to the Division of Occupational Hygiene. During the fiscal year 1952, the Division's laboratory made 1,064 analyses for lead in urine.

Since coproporphyrinuria occurs in lead poisoning, the Division recommends the semiquantitative coproporphyrin test as a routine procedure wherever a potential exposure to lead exists. In the early detection and diagnosis of lead poisoning, the coproporphyrin test is advantageous. Coproporphyrin in lead intoxication appears earlier than stippled red blood cells. It is also an adjunct in the clinical diagnosis of lead poisoning, helping the plant physician to decide which workers should be rotated in their jobs and examined frequently. This test can also be given during preplacement and periodic medical examinations.

An alert industrial nurse can spot a lead exposure in her plant if she uses this simple test. A nurse in a plant which manufactures plastic sheeting suspected the existence of a lead hazard. Studies made by this Division supported her contention. Engineering and medical controls led to the immediate elimination of the hazard.

Recognizing that the nurse is in a strategic position to note potential lead exposures, the Division has prepared for nurses a series of three bulletins on the coproporphyrin test in urine. The first of these describes coproporphyrin as one of the porphyrins or pigments present in all living things and in the human body it is necessary to form hemoglobin. Normally, an individual excretes 10 to 120 micrograms of coproporphyrin daily.

A number of body disorders, such as alcoholism, lung abscess, pernicious anemia, liver diseases, high fever, phenobarbital and other drug poisoning, and arsenic poisoning also increase the excretion of coproporphyrin. Therefore, these conditions must be ruled out before a diagnosis of incipient lead poisoning can be made.

Equipment necessary for performing the test includes a special black-light lamp. Directions for carrying out the test are given in the third bulletin. Division nurses, instructed by the staff physician, offer industrial nurses advice or assistance if they need it to use this simple laboratory diagnostic tool.—**Bernice Linde, Division of Occupational Hygiene, Massachusetts Department of Labor and Industries, 286 Congress Street, Boston 10, Mass.**

## Statistics on Industrial Nurses' Salaries Compiled

Ninety percent of industrial nurses receive from $50 to $80 a week, according to a report recently released by the Division of Occupational Health, Public Health Service.

The data on which the report is based were collected by the U. S. Department of Labor, Bureau of Labor Statistics, through its community wage surveys.

Persons interested in receiving single copies of this release, entitled, *Salaries for Professional Registered Industrial Nurses in 37 Cities and Surrounding Areas, September 1951 to May, 1952*, may write to Winifred Devlin, Nurse Consultant, Division of Occupational Health, Public Health Service, 330 Independence Ave., SW., Washington 25, D. C.

## Yale to Hold Workshop For Nurse Consultants

Yale University's Department of Public Health has planned a workshop for industrial nursing consultants to be held the week of June 15–20. The theme for study will be the promotional responsibilities of the industrial nursing consultant.

The workshop will be limited to 20 nurses, all of whom must have had at least 6 months' experience as nursing consultants. The fee is $25. Applications should be sent to Mary Louise Brown, Assistant Professor of Public Health, Section of Occupational Health, 310 Cedar Street, New Haven 11, Conn.


### COLORADO

**Community Education.**—We have introduced into our program more health education activities. We have conducted training schools for inspectors and safety engineers, and have asked for spots on programs at meetings of various societies with some interest in public health. Recently, we have introduced a service to agencies that distribute monthly bulletins among their members. For each bulletin we prepare an article on occupational health of general interest to the members. This has been extremely successful in the publication *Safety News* of the Colorado Society of Safety Engineers. We are attempting at this time to provide the same type of information for other publications, particularly some of the local mining journals and monthly engineering bulletins. This has been extremely helpful in making our services known and augmenting our relations with other agencies.—**P. W. Jacoe, Chief Environmental Control Service, Occupational Health Section, Colorado Department of Public Health, State Office Building, Denver 2, Colo.**

### CONNECTICUT

**Publication.**—Printed in two colors, a folder entitled *Health Services for Small Plants* has been issued widely to Connecticut industries. Briefly told, it is the story of how six small industrial plants in Hartford established a successful health program. Facts are included to implement its assertions and conclusions. The leaflet was published by the **Bureau of Industrial Hygiene, Connecticut State Department of Health, 1179 Main Street, Hartford, Conn.**

### LOS ANGELES CITY

**Local Health Center.**—The division director and the industrial nurse consultant attended a staff meeting of the Northeast Health Center to discuss the role, program, and scope of activity of the Division of Occupational Health. A very stimulating discussion resulted which indicates the desirability of continued staff meetings with district health centers, so that our Department personnel will become more familiar with the Division of Occupational Health.

**Chromic Acid Mist.**—A study conducted in a plating shop employing 20 workers revealed concentrations of chromic acid mist, 8½ times the maximum allowable concentration. Air samples were taken in the workers' breathing zone between 2 hard chrome tanks. A study of the exhaust ventilating systems at these tanks revealed that high vapor concentrations found here result from a make-shift arrangement whereby a slot exhaust ventilating system, properly designed for a single plating tank, was modified in an attempt to exhaust two tanks, the rate of air removal remaining constant. The obvious result is inadequate control at both tanks.

Management is to provide a new control system. Bids for this job are to specify that work be subject to the approval of the Los Angeles City Health Department. It is understood that this division is available for consultation regarding required results, along with recommendations for design and specifications, followed by a review of plans prior to construction.

**Engineering Consultation.**—As a result of recommendations following a study by this division, a plant employing 360 workers has engaged a sheet metal worker to construct a new exhaust ventilating system on a chrome plating tank. Work is to be subject to the approval of this division. As a result, we were consulted regarding our basic requirements, possible methods of design, and recommended specifications. Final plans are to be approved by this office.

It is hoped that through engineering consultation and approval of newly planned engineering controls, management may be spared the frustration of paying for inadequate installations and workers may enjoy a more healthful working environment.

**Insurance Seminar.**—During the month, a meeting of the State, city, and county industrial nurse consultants was held and plans were made to have a workshop or institute featuring the insurance programs that concern most of the industrial nurses. It is planned to invite speakers to outline (1) Workmen's compensation, (2) group insurance, (3) State unemployment and disability insurance and, (4) social security. It is hoped that this can be done sometime in the early spring or summer.

**Carbon Monoxide.**—This division was asked to survey the tow motor repair shop at a railroad station. The shop area was in a confined space having only a few windows at ceiling height and one door leading to the outside via a long curved passageway.

No major overhaul work was done there. The activity was limited to minor mechanical work such as carburetor adjustment and engine tuneup, which, however, was found to produce excessive quantities of carbon monoxide. In an attempt to simulate actual working conditions during the study, one engine was turned on for a period of 15 minutes. The concentration of carbon monoxide built up very rapidly, reaching nearly 200 parts per million parts of air within only 7 minutes after the engine was started. Because of poor air movement, high concentrations of this gas continued to be present several minutes after the engine was turned off. We recommended that a flexible tail pipe exhaust system be installed to remove all hazardous gases from the workroom atmosphere.

**Dermatitis.**—An interesting and puzzling problem in dermatitis which developed among girls employed in the assembly of a chain saw was called to the attention of the division. The epidemic of dermatitis appeared about 2 weeks before the division was called for aid, and during the period of investigation new cases developed until a total of 14 in all was reported. This presented a serious threat to production and a shutdown of the operation was considered.

An extensive investigation was conducted, including patch testing with all potential irritating material. No definite conclusions could be drawn from the patch tests, but from a study of the operation and the distribution of the eruption, it was believed that a solvent being used for cleaning metal parts was responsible for the eruption. This conclusion was reached even though apparently the same solvent had been used previously without difficulty. Accordingly, a change was advocated to another type of solvent which dried quickly. Since this change, no further cases of dermatitis developed and the girls who had been afflicted returned to the same work with no recurrence.—**Division of Occupational Health, Los Angeles City Health Department, Los Angeles, Calif.**

## LOUISIANA

**Legislation.**—For the first time Louisiana has an occupational disease compensation law. It is of the schedule type, providing compensation for six groups of diseases.

**Personnel.**—Sheldon J. Hanemann has been appointed assistant to Warren H. Reinhart, chief of the Industrial Hygiene Section. Mr. Hanemann is a chemical engineer from Tulane University and has had several years' experience with the Southern Cotton Oil Co. and the Celotex Corporation.—**Warren H. Reinhart, Chief, Industrial Hygiene Section, Louisiana State Department of Health, Civil Courts Building, New Orleans 7, La.**

## MARYLAND

**Air Pollution.**—The Division of Industrial Health and Air Pollution has recently acquired two mobile laboratory trailers to be used principally in air pollution control work. One unit is a laboratory trailer having an overall length of 30 feet and is equipped with apparatus and reagents for making necessary field determinations. It has a 30-gallon water tank with sink and drain connections, carries 5 gallons of distilled water for laboratory purposes, and has facilities for using 110-volt electric current and bottled gas. This trailer is already in field service.

The other trailer houses an automatic sulfur dioxide continuous recorder and is equipped with a motor generator for supplying necessary electric current. This unit is awaiting completion of control tests on the instrument.—**Dr. W. F. Reindollar, Chief, Division of Industrial Health and Air Pollution, Maryland Department of Health, 2411 North Charles Street, Baltimore 18, Md.**

## MASSACHUSETTS

**Speech.**—Chemist Benjamin P. W. Ruotolo, of the Massachusetts Division of Occupational Hygiene, will speak at the 32d Annual Massachusetts Safety Conference and Exposition on March 31 at the Hotel Statler, Boston. "A New Advance in the Treatment of Lead Poisoning" will be the subject of the talk at the Industrial Hygiene Session. Hervey B. Elkins is co-author of the paper.—**Bernice Linde, Statistician, Division of Occupational Hygiene, Massachusetts Department of Labor and Industries, Boston 10, Mass.**

## TEXAS

**Cotton Gin Trash.**—The incidence of complaints arising from air pollution by cotton gins has increased tremendously since the U. S. Department of Agriculture placed a quarantine on the use of the gin trash for fertilizing the fields. This was done because of the pink bollworm in this material. When this quarantine went into effect, the only alternative left to the cotton ginners was to burn the material, giving rise to acrid odors, smoke and fumes.

Since this was a nuisance to the neighboring residents, a large number of complaints were received by the Industrial Hygiene Section. It was found that by composting the gin trash with specified cultures of bacteria, it is possible to completely decompose the cellulose material into a sweet smelling humus. Along with this decomposition the temperatures within the pile reach approximately 165° F., which is sufficiently high to destroy the pink bollworm in all its stages of development. Therefore, the U. S. Department of Agriculture has modified its original quarantine so that composted gin trash may be used as field fertilizer.—**Industrial Hygiene Section, Texas State Department of Health, 410 East 5th St., Austin 2, Tex.**

## Compensation and Industrial Medical Practice Course Planned

A two-week course on compensation and industrial medical practice has been announced by the Institute of Industrial Medicine of the New York University Post-Graduate Medical School.

Scheduled for May 11 through May 22, the course is an intensive one. The first week will be devoted to workmen's compensation aspects of medical problems of importance. The second week's program is directed to the physician in industry, that is, the practitioner who is or who wishes to be employed part time in industry as well as to the physician who devotes full time to industry. The Wednesday program of this week is set up for safety men and those interested in industrial hygiene. The programs of Thursday and Friday will have much of value for personnel department staff and other representatives of management.

The tuition for the course is $50. It is possible to enroll for either week for a fee of $25 or to attend a single day session for a fee of $10. Those who wish additional information should write to the Dean, Post-Graduate Medical School, New York University-Bellevue Medical Center, 477 First Avenue, New York 16, N. Y.

## Physicians Elect Fleming President

Dr. Allan J. Fleming was elected president of the American Academy of Occupational Medicine at its fifth annual meeting, held in Rochester, New York, on February 12 and 13. Dr. Fleming is with the duPont Company in Wilmington, Delaware.

The program included a symposium on the translation of experimental toxicological data into practical criteria for plant exposure and a second symposium on the role of psychiatry in industrial training.

The second day of the meeting included a tour through parts of the Kodak Park Works of the Eastman Kodak Co., a luncheon in which the Kodak Company served as host, and a meeting which was devoted to a presentation of some of the work being done by the Kodak medical department.

Other officers elected were as follows: vice president, Arthur F. Mangelsdorff, M. D., Calco Chemical Division, American Cyanamid Corp., Bound Brook, New Jersey; treasurer, Irving R. Tabershaw, M. D., consultant in industrial medicine, New York, N. Y.; and secretary, Leonard J. Goldwater, M. D., Division of Occupational Medicine, Columbia University School of Public Health, New York, N. Y.

## Seward E. Miller Accepts Membership in IAIABC

Dr. Seward E. Miller, chief of the Division of Occupational Health, Public Health Service, has become an associate member of the International Association of Industrial Accident Boards and Commissions.

For several years Dr. Miller has been greatly concerned with varying administration of workmen's compensation funds in regard to occupational diseases. As a member of the American College of Surgeons, he has been active on the Subcommittee on Industrial Relations, an arm of the Committee on Trauma. This group has urged the medical profession to recommend early and full rehabilitation services for injured and ill workers.

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## Detroit Bureau Suggests Substitutes for Carbon Tetrachloride

**By George M. Hama**

CARBON tetrachloride is a highly toxic material. Breathing its vapors, even in small quantities, may cause illness and permanent damage to the worker's health. Heavy concentrations may result in death. Because of its high toxicity and volatility, it is difficult to adequately control processes where carbon tetrachloride is used—even with good ventilation. For this reason, it is recommended that a less toxic solvent be substituted. All solvents, however, are toxic at high concentrations and should be used only in locations with good ventilation. The following list of substitutes is given in order of preference from the standpoint of health, taking into consideration the evaporative rate, which has a direct bearing on workroom air concentrations, and the toxicity of the material:

(1) Petroleum solvents with flash points above 100° F.
(2) Methylene chloride.
    Perchloroethylene.
(3) Methyl chloroform.
    Trichloroethylene.

Where special properties are desirable, the above solvents can be mixed with each other or other material to make the appropriate mixture. The following two special mixtures have found acceptance in industry (percentages are by volume):

Motor-Cleaning Mixture—70 percent Stoddard's solvent, 25 percent methylene chloride, and 5 percent perchloroethylene.

Printer's Type Cleaner—50 percent methylene chloride, and 50 percent commercial toluene.

Properties of the substitute solvents and mixtures are tabulated below:

| Material | Evaporative Rate | Fire Hazard | Oily Residue |
|---|---|---|---|
| Petroleum solvents [1] | Very slow | Class 3 [2] | Yes. |
| Methylene chloride | Very fast | Nonflammable | No. |
| Perchloroethylene | Medium | do | Do. |
| Methyl chloroform [3] | Fast | do | Do. |
| Trichloroethylene | do | do | Do. |
| Motor-cleaning mixture | Medium | Class 3 [2] | Yes. |
| Type cleaner | Fast | do.[2] | No. |

[1] With flash points above 100° F.
[2] Detroit Fire Prevention Bureau designation, close cup flash between 70–200° F.
[3] Will attack aluminum.

**Mr. Hama is an engineer with the Bureau of Industrial Hygiene, Detroit Department of Health, 1151 Taylor Avenue, Detroit 2, Mich.**

## French Legislation Provides In-Plant Health Services for All Workers

INDUSTRIAL health practices in European countries differ markedly from those in the United States, according to Dr. Seward E. Miller, who was one of 15 guest lecturers at an occupational health seminar held in Leyden, Netherlands, in December 1952. Over 100 physicians, engineers, and others attended the seminar, representing all the western European countries and Turkey in Asia Minor. The seminar was jointly sponsored by the World Health Organization and the International Labor Office.

Throughout the 10-day meeting, panels of speakers discussed subjects of common interest, such as preplacement examinations, sickness absenteeism, the older worker in industry, mental health, rehabilitation, and in-plant health services for large and small plants.

Among the special programs of various countries which were discussed was the French law requiring every employer having 200 employees to furnish a full-time physician and nurse; under 200, part-time service must be provided.

The eight leading medical schools in France are conducting identical training courses for physicians to attend on Fridays and Saturdays, each course running for the entire school year. Training is given in organization of in-plant services, job analyses, physical examinations, detection of chronic diseases, job placement, and other pertinent subjects. As private practitioners get more and more early referral from plant physicians, since no treatment is given in the plants, the medical profession is gradually accepting this program as another phase of case finding in personal preventive medicine.

In Norway, there is no compulsory law for in-plant health services, but close to complete coverage is being achieved on a voluntary basis. Industry, the labor department, and the health department have agreed on a tri-party commission to administer the program. Treatment on the job is available to the workers, and when indicated referral is made to private physicians.

In contrast to the frequently meager record-keeping practices in the United States, the development of uniform health records in Norway was worthy of note, Dr. Miller said. As a child progresses from grade to grade, his school health records, with notations of physical examinations and illnesses, accompany him. When he leaves school, the health record goes with him to the industrial physician. If he changes jobs, his record follows him, and if he is referred to his private doctor, his record is also referred and then is returned. Certain diagnoses are recorded in a medical code.

In Sweden, as in the United States, one problem is to get part-time physicians for the small plant. Local county and city health officers are serving a number of the small plants on a part-time basis, and, according to the seminar report, these health officers find they are enjoying the practice of personal preventive medicine.

Dr. Miller, quoting the report made from Finland, said that sickness absenteeism among Finnish workers is greater in older men and less in younger men, while among women, it is the reverse. Probably pregnancy, with its 150 days of sick leave, is the major factor in the difference between the sickness absenteeism figures for men and women.

Dr. Miller said that participants in the mental health panel pointed out that, among the causes for total sickness absenteeism in 1932, the incidence of nervous diseases was only three percent for the male sex and two percent for females. In 1950, it was 14 percent for males and 15 percent for females. It was suggested that the monotony of many industrial jobs is contributing to this increased incidence of nervous and mental diseases in industrial workers, for man's adjustment in behavior patterns to our developing mechanized industrial society is not complete.

On the subject of the older worker, a great divergence of viewpoint existed among those attending the seminar. In Ireland, older workers cannot compete with younger workers and retirement is mandatory. Starting in January 1953, it was calculated that there would be more pensioners than gainfully employed persons in industry. This statement raised the question of our productive years. Young persons go to school until they are 25 or 30 years of age, then retire at 65, which leaves a relatively short span of productive years. How long can society maintain this ever-increasing segment of nonproductive individuals and still increase the standard of living of all persons?

In conclusion, Dr. Miller observed that industrial nursing, as it is practiced in the United States, is undeveloped on the European continent. He said, "Nurses serve almost exclusively as aides in the clinic. They are not responsible for counseling, referral and health education activities." Likewise industrial hygiene has never been developed as a recognized specialty as in the United States.

## New York AIHA Members Meet Twice in January

Dr. David W. Fassett of the Eastman Kodak Co. and Mr. Thomas Mercer of the Atomic Energy Project, University of Rochester, spoke January 9 at the University of Rochester before members of the Western New York Section of the American Industrial Hygiene Association.

Dr. Fassett demonstrated a rapid technique for the determining of carbon monoxide in blood, using the commonly available MSA carbon monoxide detector. Industrial applications of this technique were discussed during the course of the paper.

Mr. Mercer described experiments establishing the efficiency of the electrostatic precipitator in removing a sodium chloride aerosol from the atmosphere. These tests were carried out using sodium chloride labelled with $Na^{24}$ as a radioactive tracer and millipore filter paper. The data reported in this paper represent the first quantitative evaluation of electrostatic precipitator efficiency by means of radioactive techniques.

The program was concluded by the showing of the film used by the University of Rochester Atomic Energy Project to indoctrinate students in the radiological physics program.

Members of the organization were invited by the Bausch and Lomb Optical Co. to a luncheon meeting January 31.

Speaking at this meeting were Mr. Germain Crossmon on the subject, "The Microscopy of Toxic Dusts," and Dr. N. Kreidl on "Dosimeter Glass."

## PHS Plans Training Courses for Industrial Chemists and Engineers

A 2 weeks' course designed primarily for industrial hygiene engineers and chemists in official agencies has been announced by the Division of Occupational Health, Public Health Service. It will be given June 1–12, 1953, at the field headquarters in Cincinnati.

Consideration of the basic principles in field and laboratory studies of the industrial environment will receive a large share of the lecture and discussion periods. Time will be allowed also for consideration of practical problems and the performance of laboratory work.

At the start of the course, chemists and engineers will attend combined sessions on subjects of mutual interest, but will separate for specialized lectures and laboratory practice in their own fields.

The first week's schedule for the chemists will deal with orientation, industrial toxicology, dust and fume sampling, particle-size measurement, gas and vapor sampling, physical methods of analysis, and chemical and analytical procedures. Four days of the second week will include a continuation of chemical and analytical procedures. The final day will include an introduction to health physics and a summary of the course.

The agenda for the engineers will include orientation, mist and fume sampling, dust sampling and counting, particle-size measurement, gas and vapor sampling and analysis, direct reading instruments, calibration procedures, toxicology, health physics, engineering control methods, ventilation, physical agents, and a summary.

Although the courses are planned especially for individuals with limited experience in the environmental aspects of occupational health, they can serve as useful refreshers for persons who have been in this work for longer periods. While the courses will concentrate on fundamentals, time will be provided for consideration of any special problems which members of the classes may have.

The attendance will be limited so that all students may participate to the fullest extent in both discussions and laboratory activities. Anyone interested in these courses may obtain further information by writing to Occupational Health Field Headquarters, 1014 Broadway, Cincinnati 2, Ohio.

## Evaluation of Oral Injuries Calls for Expert Advice

**By Leonard S. Morvay, D. D. S.**

THERE is no greater help to an attorney in the adjudication of an industrial illness or accident than a true, unexaggerated, professional interpretation of the extent of physical injuries, an honest prognosis, and the quotation of normal fees involved. At least, he has an accurate barometer, so to speak, to guide him in the equitable settlement of the case.

When the injury is confined to the teeth and jaws of the worker, the lawyer has several unusually difficult problems to solve. The first is to find a dentist who is familiar with dental and jaw injuries. The average dentist has had little experience in this field. The second is to find a dentist who is willing to sacrifice his appointments and take time to go to court. Often cases are postponed at court and the dentist's time is wasted.

Consequently, attorneys have been handicapped in attempts to obtain for their clients fair compensation for the injuries sustained. As a result, the following practice has become common. For lack of better criteria, the percentage of permanent disability following the injury to an extremity is frequently decided by a compromise settlement, that is, the respondent's representative may decide on a 10-percent of total disability, the petitioner's attorney claims 20 percent, and as a result, the court and the litigants settle for a 15-percent award.

This arrangement prevails after many years, following the review of thousands of previous cases, schedules, and interpretations to determine the amount of disability. In dental and jaw injuries, the schedules and interpretation of disability percentages are practically nil in the compensation laws. In most States, the interpretation is left to the physician, who will admit that he knows very little about this particular specialty and, by the same token, the referee who hears the cases knows far less, if anything at all, about the subject.

Therefore, it is up to the lawyers to take the responsibility of selecting the best dentist available and instructing him to consider the case just as though there were no coverage by insurance, personal liability through legal channels, or other financial provisions. Conversely, the dentist should present the status and prognosis of the case just as if he were explaining it to a patient who had come to his office for a diagnosis without legal entanglements.

The dentist should not recommend extraction of teeth when there is the remotest possibility of preserving them by immobilization with splints or by other dental techniques.

The examining dentist should not jump to the conclusion that a tooth is to be sacrificed because the pulp (nerve) has been temporarily impaired or that the tooth will not serve satisfactorily, provided that scientific root canal therapy is instituted. Nor should he think that when the crown of a tooth has lost part of its structure it cannot be restored to look as well as, and possibly better than, it did before injury.

Frequently, when the periphery of the jaw bone immediately surrounding teeth is broken off, the dentist too often reports that the jaw has been fractured. This is not truly a fracture but a chipping of the end of the bone, which is exactly what happens in the ordinary extraction of teeth: healing is uneventful.

The physician and even the dentist should not attempt to set a jaw fracture unless thoroughly trained and experienced in rendering this service efficiently so that function may be normally restored when the fracture has completely knitted. If there is still some limited jaw function for a time after treatment, the dentist should inform the attorney that complete function can be expected to return in several weeks or possibly a few months and that the limited jaw function is usually a temporary condition.

There are methods to determine normal jaw function following fracture, one simple method being to test muscular tone by having the injured person

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bite into a semisolid block of beeswax. The question of normal articulation following jaw fracture plays a very important role in determining the percentage of disability.

Many dental opinions are rendered concerning the percentage of permanent jaw disability based upon what appears to be an abnormal bite, which too often is the normal bite of the injured and is, in no way, associated with the result obtained following knitting of the fracture.

Costs and services for creation and insertion of artificial appliances should be estimated by the examining dentist on the same ethical basis as the estimation of disability, with no thought being given to the fact that litigation is involved. A just, reasonable, and honest estimation of an average fee in the geographical location of the examining dentist should be submitted to the attorney, and the latter should insist that this be included in the estimate submitted.

You may notice that I have confined most of my remarks to compensation cases. In civil cases there is a much greater spread in awards and, as you know, one can never foretell what awards will be decided upon by juries. Fundamentally, the attorney should request of the examining dentist in such cases the same approach concerning his estimation of liability, prognosis, and fees as in a compensation case.

## COVER PICTURE

Therapy to keep a man from losing time on the job is a widely accepted practice. Periodic physical examinations are highly recommended also for early case-finding and other preventive measures. These men are receiving heat treatments at the Standard Oil Company's Baton Rouge Refinery.

## ACGIH Program—

**(Continued from page 50)**

Jacoe is with the Occupational Health Service of the Colorado Board of Health, Denver. Mr. Tsivoglou, Mr. Ayer, and Mr. Holaday are on the staff of the Public Health Service's Occupational Health Field Station, Salt Lake City, Utah.

Standing committees are scheduled to meet Saturday, April 18, and round table discussions will be held as usual on Sunday. Chairmen of the Chemists' Group are Wesley J. Roberts, California Bureau of Adult Health, and D. E. Rushing, U. S. Public Health Service. Chairmen of the Engineers' Group are C. D. Yaffe, U. S. Public Health Service, and A. F. Bush, University of California. Chairwomen of the Nurses' Group are Winifred Devlin, U. S. Public Health Service, and Marion S. Wayne, Division of Industrial Hygiene, Los Angeles County Health Department. Chairmen of the Physicians' Group are Dr. D. J. Birmingham, U. S. Public Health Service, and Dr. Ralph R. Sullivan, Industrial Hygiene Section, Oregon State Board of Health.



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