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diately after the introduction of the material in the position marked I. It is, therefore, felt that such roentgenological examination is useless and only early surgical exploration will determine whether the wound is merely a puncture or one that contains a fragment of the offending instrument. At the body temperature and in the tissue fluids it is felt that the "lead" liquefies and disintegrates within a period of minutes. This is borne out by the inability to find the "lead" as such one hour after introduction into the tissues of the guinea pig.

Case 4 will serve to demonstrate the advisability of excising in toto the affected area, if seen within one to two hours from the time of the injury and if it is situated in an area wherein sufficient adjacent tissue is available for closure of the defect. Otherwise, wide debridement of all stained tissue with open drainage should be undertaken. In this way, it is our firm opinion, disfiguring scars can be largely avoided and the period of convalescence and disability greatly reduced.

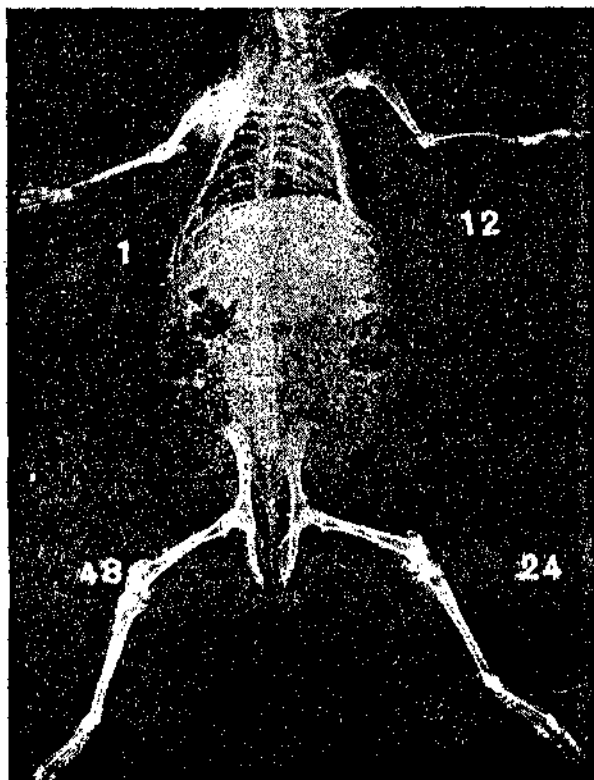


Fig. 3.  
Roentgenogram revealing no shadow suggestive of "lead" immediately, and 12, 24 and 48 hours after its introduction into the proximal portions of the extremities

**CONCLUSIONS:** (1) "Indelible lead" puncture wounds with their period of physical and economic disability must be considered of major import.

2. Secondary infection of the wound is not to be feared.

3. Roentgenological examinations of the part affected are of no diagnostic aid.

4. Excision in toto or wide debridement with drainage, dependent upon the part injured, are the therapeutic procedures of choice.

## Industrial Hygiene

—Abstracts of Papers Presented at the Industrial Hygiene Section of the 69th Annual Meeting of the American Public Health Association, Detroit, Michigan, October 7-11, 1940—

Reported by C. O. SAPPINGTON, M. D., DR. P. H.

**W**ITH more interest than has before been manifested in industrial hygiene and occupational disease subjects, the Industrial Hygiene Section meetings of the 69th Annual Convention of the American Public Health Association attracted capacity audiences. The seven sessions included a preliminary session (Symposium on Occupational Diseases); a regular luncheon meeting; a joint meeting with the Engineering Section and a joint meeting with the Public Health Nursing Section. There were important technical papers, as well as addresses on administrative subjects. The results of both types of work showed that distinct progress has been made within the past year. The program follows:

**MONDAY, 2:00 P.M.—SYMPOSIUM ON OCCUPATIONAL DISEASES** (sponsored by the Industrial Hygiene Section).

Presiding: KENNETH E. MARKUSON, M.D.

The Health of Storage Battery Workers, W. C. DREESSEN, M.D.

Control of Exposures in the Electroplating Industry, P. B. RASTELLO, M.D.

Putting the Tools of Industrial Hygiene to Work in the Administration of an Occupational Disease Law, S. C. ROTHMANN.

Prevention and Treatment of Experimental Silicosis by Aluminum Powder, D. IRWIN, M.D.

**TUESDAY, 9:30 A.M.—INDUSTRIAL HYGIENE.**

Presiding: CLARENCE D. SELBY, M.D.

Address of the Chairman. The Renaissance of Industrial Hygiene. CLARENCE D. SELBY, M.D.

A Preliminary Survey of the Industrial Hygiene Problem in the United States, JOHN J. BLOOMFIELD.

Discussion—HERBERT G. DYKTOR.

Disabling Sickness Among Industrial Workers with Particular Reference to Time Changes in Duration, WILLIAM M. GAFAFER, D.Sc.

Discussion—RICHARD D. MUDD, M.D.

**TUESDAY, 2:30 P.M. — ENGINEERING AND INDUSTRIAL HYGIENE SECTIONS. Joint Session.**

Presiding: ERNEST BOYCE, C. E., and CLARENCE D. SELBY, M.D.

General Atmospheric Pollution from Gaseous Contaminants, WILLIAM CROCKER, Ph.D.

Composition of Diesel Exhaust Gas, HELMUTH H. SCHRENK, Ph.D. and L. B. BERGER.

Discussion—LEONARD GREENBURG, M.D.

A Study of Dust Conditions in the Tri-State District of Kansas, Oklahoma and Missouri, CHARLES C. DILLS.

Engineering Services in Industry Other Than Control of Occupational Diseases, JOEL I. CONNOLLY.

**WEDNESDAY, 9:30 A.M.—INDUSTRIAL HYGIENE.**

The Exposure of Workmen to Lead Fume During the Production and Processing of Leaded Steel (Ledloy), A. G. KAMMER, M.D.

Discussion—LOUIS W. SPOLYAR, M.D.

Comparison of Methods for Sampling Lead Fume, LEWIS B. CASE.

Discussion—EDWIN D. MARTIN.

The Response of Animals Attending Exposure to the Vapors of Methyl Bromide, DON D. IRISH, Ph.D., E. M. ADAMS, H. C. SPENCER, and V. K. ROWE.

Discussion—ROBERT A. KEHOE, M.D.  
Chronic Manganese Poisoning, ROBERT H. FLINN, M.D.,  
PAUL A. NEAL, M.D., and WILLIAM B. FULTON, M.D.  
Discussion.

### WEDNESDAY, 12:30 P.M.—INDUSTRIAL HYGIENE— Luncheon.

Report of the Committee on Skin Irritants. Chairman,  
LOUIS SCHWARTZ, M.D.

Report of the Committee on Lead Poisoning. Chair-  
man, ROBERT A. KEHOE, M.D.

Report of the Committee on Pneumoconiosis. Chair-  
man, R. R. SAYERS, M.D.

Report of the Committee on Standard Methods for the  
Examination of Air. Chairman, EMERY R. HAYHURST, M.D.

### THURSDAY, 10:30 A.M.—INDUSTRIAL HYGIENE AND PUB- LIC HEALTH NURSING SECTIONS.

Presiding: MARION W. SHEAHAN, R.N. and CLARENCE D.  
SELBY, M.D.

Difficulties in Keeping the Industrial Nurse in Small  
Plants in Touch with Public Health Nursing, VICTORIA C.  
STRALCO, R.N.

The Use of Existing Visiting Nurse Associations in In-  
dustrial Service for Small Plants, RUTH W. HUBBARD, R.N.

Opportunities of a Nurse in the Control of Occupational  
Health Hazards in the Small Plant, T. LYLE HAZLETT, M.D.

Discussion—DONALD M. SHAFER, M.D.  
Health Maintenance in a Group of Small Industries,  
RUSSELL B. ROBSON, M.D.

### FRIDAY, 10:30 A.M.—INDUSTRIAL HYGIENE.

Quantitative Analysis by X-ray Diffraction: The De-  
termination of Quartz, JAMES W. BALLARD, Ph.D. and  
HELMUTH H. SCHRENK, Ph.D.

Ventilation Problems in Industrial Hygiene, P. W.  
GUMAER.

Discussion—W. J. McCONNELL, M.D.  
Field Instruments and Methods for Rapid Determina-  
tion of Air-Borne Contaminants, WILLIAM P. YANT.

### Monday Afternoon Session

DR. W. C. DREESSEN in speaking about "The  
Health of Storage Battery Workers," stated  
that one of the most important things is the con-  
trol of the lead hazard in this group. The inci-  
dence of lead poisoning is decreasing generally in  
all industries. According to Hoffman's figures,  
the decrease has been from 3.1 in 1903 to 0.17 per  
100,000 persons in 1932. This of course is due to  
earlier recognition of cases of lead absorption and  
lead poisoning and also better hygienic condi-  
tions.

In a preliminary survey of 26 plants which was  
first attempted, representing 6000 workers, it was  
found that this was about 50% of the whole in-  
dustry. Three plants were used for engineering  
surveys and one plant for medical study.

In the engineering study, 360 samples were  
analyzed, of which 288 were air samples and 72  
were blanks on water samples, rafter dust, and  
other materials. Method of collection was the  
use of impingers in parallel series, and the tech-  
nique for analysis was a modified chromate  
method.

Lantern slides were used to show the size dis-  
tribution of the occupations in the various plants;  
summary of air-lead findings in different depart-  
ments and occupations; a flow sheet of materials  
and plant processes, which also gave the lead  
exposure; a comparison of controlled versus un-  
controlled exposures.

Of 776 examinations made. it was found that

176 persons were affected by early plumbism.  
Only 16 cases showed more than 100 stippled cells  
per 100,000 red cells. It is believed that the  
reticulocytes furnished a more sensitive test than  
basophilic aggregations. Fifteen percent of the  
cases showed albuminuria.

Analyses of blood and urine were also made  
for lead content in this group.

The results of this study show no necessity  
for a change in the 1930 standards of lead in air,  
namely 1.5 milligrams per 10 cubic meters.

It was concluded that a carefully coordinated  
program is necessary for the proper results in this  
industry.

There was discussion of this paper by Drs.  
Sladen, Smyth and Gray.

DR. P. B. RASTELLO spoke on the "Control  
of Exposures in Electroplating Industry."

To properly evaluate the hazards in industry,  
physicians must be conversant with them and be  
alert to changes which may occur.

In electroplating, heavy metals, salts, acids,  
and alkalis are the principal materials with  
which we are concerned and constitute occult  
health hazards rather than visible and physical  
ones. The respiratory tract is mainly the route  
of entrance.

In general, there are only two gases which are  
involved, oxygen at the anode and hydrogen at  
the cathode; the amounts liberated are of no  
consequence.

Bubbles of fine spray are really the chief con-  
cern.

In the degreasing of parts, it is best always to  
use a closed system if that is possible. Washing  
in hot alkaline solutions through which an elec-  
tric current is passed produces a great deal of  
vapor and also hydrogen and oxygen.

When pickling in weak acid, there is always a  
possibility of formation of arsine and this opera-  
tion should be exhausted.

Instructions should be given for handling com-  
pounds in solutions, especially with reference  
to keeping acid and cyanide compounds separated  
from each other.

Chrome plating is done on hardware parts and  
the process should be exhausted, the exhaust de-  
vice being built into the tanks.

It is important to remove vapors and gas about  
six inches above tanks; the exhaust should be as  
narrow as possible and the vent should be put  
on the long side of the tank.

In order to cope with these problems, one must  
know the toxic substances which are present in  
the working environment, the concentration of  
substances in the air, and the maximum concen-  
tration inhalable. In the organization of the  
speaker, a maximum concentration list has been  
prepared based on previous lists and also on ex-  
perience with workers' exposure. A health haz-  
ard committee has also been formed which re-  
presents various departments.

It is only through air analyses that we can pos-  
sibly get the real answer as to the working con-  
ditions. In conclusion. it can be stated that no

dust, fumes, gases, or vapors exist that cannot be controlled by a competent engineer when he knows the conditions.

**M**R. S. C. ROTHMANN discussed the subject "Putting the Tools of Industrial Hygiene to Work in the Administration of an Occupational Disease Law."

It was first stated that it is not an easy task to use the tools of industrial hygiene in the administration of laws.

Historical development of various compensation laws was reviewed, calling attention to the passage of the law in Maryland first in 1902, which was declared unconstitutional and which later became effective in 1910. Forty-six out of the 48 states now have compensation laws of some kind and in most instances medical benefits and compensation are provided.

West Virginia has set up its own law providing for insurance and compensation angles and has made election optional, although indirectly it is a compulsory law.

A review of recent occupational disease legislation was given referring to 30 jurisdictions, including Hawaii as the first in 1917.

Lantern slides were given showing various maps and forms, among them a map of the U. S. Labor Department, comparing 1930 with 1940 occupational disease provisions; a tabulation of different types of laws covering occupational diseases premium rates on silicosis applied to self-insurers; organization of West Virginia Silicosis unit; examination and report forms of various types.

Allusion was also made to the various state surveys as done in West Virginia on industrial hygiene subjects.

In conclusion, it was stated that the commission in West Virginia has not departed from the regular routine in handling claims. Up to this time 58 claims have been accepted for silicosis and 38 have been rejected, with 22 awards totalling \$19,571.00. An important principle to keep in mind is that one must combine common sense with all available information.

Mr. Rothmann's paper was discussed by Dr. Hayhurst, Dr. J. L. Jones, of Utah, and Drs. Greenburg and Price, of New York.

Dr. Hayhurst believed that industrial hygiene is not exactly a foundling infant. Malingering needs more attention and less blame. The British have really set the pace for governmental activities. A distinction was made between the definition of occupational diseases and the definition of injuries. A discussion was also given of the definition of silicosis as provided in the West Virginia law. Allusion was made to the fact that in 1902 Dr. C. F. L. Deering investigated the industries in Washington, D. C., in an extensive survey.

Dr. J. L. Jones believed that an industrial hygiene unit could best function as a fact-finding, preventive group. This was also concurred in by Dr. Greenburg in referring to the New York system and Dr. Price in reference to the North Carolina experience.

**D**R. D. IRWIN gave the last paper on the program of the symposium on occupational diseases on the subject "Prevention and Treatment of Experimental Silicosis by Aluminum Powder."

It is agreed that the best way to prevent silicosis is to prevent the inhalation of free silica dust, but that still presents a problem.

The research work described in this paper is in no way in competition with dust control measures.

Investigations were made concerning the mechanics of excretion of dust from the lungs and also with reference to the role of infection and chemical irritation.

The author believed that three real contributions have been made since 1920, those of Gye and Purdy in 1922; Gardner and Cummings in 1934; and since that time Kettle and Heffernan.

A series of experimental animals were dusted with aluminum and silica dusts in combination and also another group with silica dust alone. It was observed that in the former experiments where there was a combination of aluminum and silica dusts, no fibrosis was produced in the lungs; whereas when dusting with silica dust alone, fibrosis occurred. Numerous lantern slides of lung sections were shown illustrating these results.

Solution of silicates was also materially affected by adding 1% of aluminum. It was found in later experiments that 0.05 and 0.01% aluminum dust were almost as effective against quartz solutions as 1% aluminum.

The observations made suggested that hydrated aluminum oxide was responsible for the reduction of the quartz and did this by coating quartz particles with an inert material.

Pathological slides relating to animal experiments were shown, particularly with reference to oron, a dye which brought out the presence of the aluminum coating.

It was stated that aluminum therapy has no effect on fibrosis which has already occurred, but the use of aluminum does alter the reaction of quartz originally.

The author stated that it was hoped that arrangements could be made to do clinical tests which would show something of importance.

#### Tuesday Morning Session

**D**R. CLARENCE D. SELBY gave the Address of the Chairman of the Section on "The Renaissance of Industrial Hygiene."

There are a number of important elements involved in industrial hygiene—it must be a program for the workers; management wants to know the real facts; industrial hygiene benefits industry, but its cost must not be over-expensive. Industrial hygiene also has a definite contribution to make to labor relations. The industrial hygiene engineer has proved his worth, although it involves a new profession with some rivalry. However, there is wholesome competition and accomplishments will really count.

The real basis for the renaissance of industrial hygiene is in the awakening of the medical profession.

The American Medical Association's Council on Industrial Health has in process various activities which will in themselves gain the interest of the medical profession: the training of physicians to recognize occupational diseases; the proper training of industry and labor; the elevation of health standards; social legislation; clarification of relationships of private and industrial practice; the relationships of insurance companies, and finally the relationships to state agencies.

At the present time 31 states have industrial hygiene units and this calls for trained personnel.

In one of the defense meetings recently held, a program for national defense was presented and in essence it was stated that "the job can be done safely, provided we utilize knowledge already available."

It should be emphasized, however, that such activities should not be merely temporary, but should be supplemental to all other phases of adult health activities and should consist of the following: (1) the evaluation of a hazard; (2) advice to industry; (3) physical examination procedures; (4) toxicology and ventilation; and (5) consideration of syphilis, tuberculosis and communicable diseases.

There is no longer any question of the value of industrial hygiene. Training programs of six to nine months' duration should be provided in the proper teaching institutions. In conclusion, industrial hygiene has demonstrated both humanitarian and utilitarian values.

**MR. J. J. BLOOMFIELD** presented the subject "A Preliminary Survey of the Industrial Hygiene Problem in the United States." The basis for this presentation was the material which has previously been published as U. S. Public Health Service Bulletin No. 259.

The speaker stated that he would give only a few highlights of the material presented in the above publication. The first step is to define the problem of state units through what is known as the preliminary survey. The effects of this definition are threefold: (1) the personnel gets acquainted with plants and their officials; (2) knowledge is gained of the hazards associated with a variety of occupations; and (3) the industrial hygiene unit becomes acquainted with various physicians, insurance representatives, engineers and others who are concerned with the problems of industrial hygiene in the various plants.

With a series of lantern slides, the geographical representation of states with reference to population and percentage of samplings were shown. The survey involved 16,803 plants, with a population of one and a half million people, in 15 different states. The industries concerned were mineral, manufacturing and mechanical, transportation, and personal service.

In this group it was shown that 62.6% of the plants had less than 500 employees. Total cost of compensation and medical care was \$26.00 per person in small plants as against \$11.00 in those having 1000 employees or over.

Only 15% of the group of employees involved had the services of a full-time physician.

Tabulations on lantern slides showed the number of employees exposed to various types of substances and conditions. Tabulations were also shown of the percentage of instances in which protection was provided where it was deemed necessary.

The data thus provided gave an idea of the potential problems involved in industrial hygiene practice in the United States.

The speaker particularly emphasized in closing that industrial hygiene activities should be built on a permanent basis and not for defense alone.

**MR. HERBERT G. DYKTOR** opened the discussion of Mr. Bloomfield's paper, making in summary, his points as follows: (1) industrial hygiene must fulfill a definite need; (2) industrial hygiene cannot be temporary in its activities; (3) industrial hygiene must be expanded in official agencies and in industries; and (4) industrial hygiene must concern itself with adult community health problems.

In closing the discussion, Dr. C. M. Peterson, of the American Medical Association, outlined the Association's plans for state and county society activities relative to the supplying of information for practitioners of medicine.

**DR. WILLIAM M. GAFAFER** concluded this session by his presentation "Disabling Sickness Among Industrial Workers with Particular Reference to Time Changes in Duration."

The basis for this discussion was a recent report from Scotland covering the years 1935-36 and 37, which indicated a heightened interest in chronic incapacitation, a formidable problem for insurance companies.

Some of the statistics were very illuminating: 42% of the cases were so-called long illnesses; 46% occurred in the age period 35 to 55 years—41% occurred in persons over 55 years of age. Tuberculosis and mental cases showed an increased incidence under age 35. Diseases of the nervous system appeared to be particularly high in incidence in the age group 35 to 55 years. Those over 55 years of age showed diseases of the nervous system, rheumatism, heart disease, bronchitis and pneumonia, as the most frequently occurring.

Perhaps one of the most significant items of the report was the one which showed an increase of 8.3 to 14.1 days lost per person in the period covered by the report, 1935-1937 inclusive. As a reason for this increase, in a discussion in the report, by McKinley, two factors were cited: the ageing of the population and a decline in the mortality rate.

Railroad experiences were given relating to the average duration of time lost in days and the frequency of disabling conditions per 1000 persons. There was an increase in days lost through 1930-1935 inclusive. The rate for all ages increased from 13.1 to 23.1 days. There was also an orderly increase by age groups.

Frequency decreased in the five-year period cited, but increased with respect to age. It was pointed out that frequency rates are rather inadequate in describing the real picture.

In summary, it was stated that chronic incapacity is becoming increasingly important as an industrial problem. The average duration is upward, but frequency rates are inadequate to show the real situation.

**D**R. RICHARD D. MUDD opened the discussion of Dr. Gafafer's paper, stating that this was a most important subject and that one of the vital points is absenteeism of over 10 days which occurs in industrial establishments. Factors which may definitely influence this are increased age of employees and military conscription.

The important factors to be considered in absenteeism studies are diagnosis by a physician; type of industry; occupation; calendar days lost; working days lost; age and race; hours of work by days, weeks, and years; type of shift; season; recurrence of disability; insurance or benefit plans; and amount of checking of absentees which is done.

Figures were given from a grey iron foundry experience, which showed that the relation of disability frequency to age was a fairly close one in this instance. Specimen forms for records of absenteeism were also shown by lantern slides.

Drs. G. Parrot and L. Teleky concluded the discussion of Dr. Gafafer's paper, laying emphasis on chronic diseases in older persons and experience with sick benefit funds in Europe.

#### Tuesday Afternoon Session

**D**R. WILLIAM CROCKER presented the subject "General Atmospheric Pollution from Gaseous Contaminants," basing a great deal of his material upon experiences with growing plants.

The first studies were done in 1908 and an institute was formed in 1920, and now animals, as well as plants, are subjected to experimental procedures.

Experiments have been done with carbon monoxide, propylene, acetylene, ethylene, hydrocyanogen gas, and sulphur dioxide.

Certain types of gases break down the chlorophyll and shrivel the leaves and blossoms; other types of gaseous contaminants stop growth, and still others stimulate root growth.

There have been, however, some commercial adaptations, such as the bleaching of celery, processing English walnuts, and the ripening of tobacco.

It is significant that one part in 10 million of ethylene would inhibit the growth of some plants 40 to 50%. Sulphur dioxide kills tissues, but leaves radicals. In animals, exposures of 25 to 35 parts per million usually ends in indefinite results. In one series, 80 parts for many weeks were given in eight-hour exposure periods, allowing 16-hour periods for recovery, without deleterious results.

Insects are more sensitive to hydrocyanic acid gas than mammals. It has been observed that animals exhibit a swollen abdomen when thus exposed.

A number of lantern slides of photographs of plants were used to illustrate the important points in this presentation.

**D**R. H. H. SCHRENK presented the subject "Composition of Diesel Exhaust Gas."

Diesel engines have been suggested for underground use, such as in tunnels and in mines, because of the low carbon monoxide exhaust and because of the lessening of fire hazards.

Experiments are conducted after an engine has been run for 100 hours before the tests were started. A good grade of fuel has been used. A lantern slide showed the construction of the apparatus for the collection of gases. As the fuel-air ratio increased, oxygen increased and carbon dioxide increased up to the occurrence of what is called the chemically correct mixture. The fuel-air ratio must be controlled to keep the carbon monoxide down to proper limits. The aldehydes are of importance because of their nuisance element.

The results of these experiments indicate that one can definitely control the amount of carbon monoxide and smoke by properly adjusting the fuel-air ratio.

**D**R. LEONARD GREENBURG discussed Dr. Schrenk's paper.

Practical experience was encountered in the problems of an 85-mile aqueduct in the vicinity of New York. Specifications were developed as follows: (1) fuel must not contain greater than 0.3 of 1% of sulphur; (2) fuel must not be stored underground; (3) the machines are set at a point of giving a ratio of 20 to 1; (4) extra fuel pump is set and sealed and provided for each engine; (5) the engine manufacturer must specify the minimum and maximum idling speed and the maximum power output; (6) flame arresters must be provided so that the exhaust does not reach higher than a temperature of 400 degrees; (7) exhaust of gases must be at a point remote from the operator; (8) exhaust gases must be cooled by water; (9) exhaust dilution must be 10 times before released; (10) water storage level control must be locked to the fuel line, when level is down; (11) electrical equipment must be used for frequent starting.

At first, one part in 10,000 carbon monoxide was set up as a criterion; this is now used as a check for other irritating gases and is now used as 0.002%. A criterion of 40 parts per million of oxides of nitrogen is used.

Various safe practices are set up, including weekly inspections, pre-working tests, minimum standards for ventilation, and the prohibition of working in explosive gas unless permitted by the Bureau of Mines.

**M**R. CHARLES C. DILLS presented "A Study of Dust Conditions in the Tri-State District of Kansas, Oklahoma and Missouri."

There is a district approximately 18 miles square with Picher about the center of the district, which is concerned in this study. The material in this region is highly siliceous, containing about 88% free silica.

Dust samples had been taken on various surfaces, in mines and mills, as well as roentgenological films.

County roads are surfaced with silica tailings and there are also tailings ponds, where the material is dumped. Stations for surface dust collection were established in various places and as the usual thing, the wind velocity was approximately 15 miles per hour.

The average rainfall was about normal during the course of this study.

In 1939, 76% of the counts showed less than five million particles per cubic foot of air; in 1940, 88% of the counts showed less than five million particles per cubic foot of air. Wet methods and proper ventilation have permitted the control which has been thus accomplished.

**MAJOR JOEL I. CONNOLLY** concluded the Tuesday afternoon session in summarizing "Engineering Services in Industry Other Than Control of Occupational Diseases."

Safety and occupational disease work were mentioned as the usual forms of engineering practice, but others are important, such as: (1) illumination, (better work and health—mixture of yellow and red better than mercury lamps); (2) noise as the result of industrial activity and the result of community activity; (3) water-borne diseases, as the result of cross connections, contaminating drinking water; (4) activity and body temperature, particularly with various problems which arise and with reference to experiences with hot temperature and the use of salt tablets; (5) housing, poor practices leading to unhygienic habits and poor living conditions; and (6) nursing in industry, which has shown very definite improvement in standards and results.

Major Connolly's paper was discussed by Drs. Poole, Gray and Hayhurst.

#### Wednesday Morning Session

**DR. A. G. KAMMER** outlined his experience with "The Exposure of Workmen to Lead Fume During the Production and Processing of Leaded Steel (Ledloy)."

This work was begun in the year 1937. In a description of the processes involved, finely divided lead is added to molten steel so that it is distributed evenly and microscopic sections of ingots show that there is an even distribution of the lead through the steel. Steel may be rolled hot in a later process and there is a tendency to scale formation. No lead arises from the bar, but there is some from the scale.

An open hearth exhaust system has been developed, particularly to take care of what lead arises in this operation.

Lantern slides were used to show the different amounts of lead in different operations. Eight

one-hour samples, for example, averaged 0.443 milligrams. Stack samples in the yards showed that there was no significant exposure. In the blooming mill, the average in two heats was 1.39 milligrams.

Urine and fecal lead analyses were done and of several workmen who were examined in this respect none showed a range above normal excretion, although one showed slightly above normal excretion.

In the billet mill, grab samples showed only normal amounts of atmospheric lead.

In the process of scarfing, there were about 3 milligrams of lead in the breathing zone.

A special examination form has been developed for use among these employees, this being illustrated on a lantern slide.

About 250 men have been under observation since January, 1938, the basophilic aggregation counts showing values of 0.31%—0.33%—0.34%. The hemoglobin content varied from 93 to 94. It was, therefore, concluded that there were no signs of lead absorption among these workers.

In summary, 250 workers were observed, none of whom showed evidence of plumbism. The special exhaust system has been working satisfactorily. Although exposures in the steel pits and scarfing operations showed above allowable concentrations of lead in the air, adequate protection can be provided for these occupations.

**DR. LOUIS W. SPOLYAR**, in discussing Dr. Kammer's paper, said that he had first heard of this work two years ago and he, therefore, visited the Inland Steel plant. This he considered an example of real prevention and studious check-up.

**MR. LEWIS B. CASE** gave "Comparison of Methods for Sampling Lead Fume."

There are two forms of instruments to be used, namely the impinger and the electric precipitator. The question arises as to the relative efficiency of these methods. The previous experiences of Littlefield and Schrenk, and also of Halley and Martin, were outlined.

It seems reasonable to say that the variation in efficiency is a function of particle size.

We should keep in mind that the standard of 1.5 milligrams per 10 cubic meters of air is based on the experience of the U. S. Public Health Service with the impinger dust collector method.

An apparatus especially designed by the author was shown by lantern slides.

In comparisons of the impinger with the electric precipitator, short time runs show the impinger collector samples larger amounts than the precipitator. A comparison of the precipitator with asbestos filter shows a high ratio.

In summary, it has been shown that the efficiency of the impinger as compared with the precipitator is higher when there are higher concentrations of fume. There is no real uniformity, however. All tests for small amounts of lead in the air are beset with difficulties.

**M**R. EDWARD D. MARTIN, in discussing Mr. Case's paper, said that many questions have arisen with reference to comparison of these two methods. Experience has indicated that the electric precipitator must be watched carefully. This device may show a low ratio when compared to four impingers in series. The important factors to be considered in comparing these two methods are retention, size of particles, and watability.

**D**R. DON D. IRISH spoke on "The Response of Animals Attending Exposure to the Vapors of Methyl Bromide."

There has been considerable interest in insect fumigation with the use of methyl bromide.

The problems which immediately present themselves are (1) toxicity; (2) nature of action; and (3) precautions.

Similar data have been published by the U. S. Public Health Service and were given here, showing toleration of large doses for short periods of exposure and the observance of confluent bronchopneumonia in certain cases. Apparently the animals are able to rapidly destroy the bromide, which is broken down in the blood to form other bromides.

There are similar responses to ethyl, amyl, and propyl bromides.

Apparently the functional responses are due to alkyl bromide effects.

The U. S. Public Health Service on May 16, 1938 issued precautions concerning the handling of methyl bromide and it was concluded that the substance can be handled without injury.

**D**R. LUDWIG TELEKY and **D**R. LOUIS SCHWARTZ discussed Dr. Irish's presentation. Experiences with methyl bromide poisoning in men seemed to differ somewhat from those in animals; epileptic attacks were noted in clinical cases, and pathologically there were changes in the ganglion cells.

**D**R. PAUL A. NEAL concluded the Wednesday morning session in presenting a paper on "Chronic Manganese Poisoning."

The occurrence of chronic manganese poisoning among the 34 employees of a manganese ore-crushing mill was found to vary with the atmospheric manganese concentration and with the length of employment. Eleven cases were found. None of the nine men exposed to less than 30 mg. of manganese per cubic meter was found to have the disease, although only two of these nine men had been employed more than three years, and several had only intermittent exposure; on the other hand, five of the six men exposed for more than three years to atmospheric manganese concentrations exceeding 90 mg. per cubic meter were found to have the disease. Tests made in a modern mill showed that the workers' exposure could be reduced to at most 6 mg. per cubic meter by the use of enclosed machinery, mechanical conveyors, and exhaust ventilation.

The disease is characterized by muscular incoordination which becomes evident first in the form of difficulty in walking. Later, many parts of the body are affected and disability results. Most of the usual laboratory tests applied to blood, urine, and cerebrospinal fluid gave normal results.

Manganese-affected workers, however, had low leucocyte counts, particularly in neutrophilic cells, and in Lange's test the middle range of dilutions of cerebrospinal fluid gave slightly positive reactions.

Recommendations for medical and engineering control were given, emphasizing routine physical examinations at regular intervals; giving special attention to disorders in gait and speech, and such symptoms as weakness, drowsiness, and muscular twitchings and cramps; and to engineering control measures for the prevention of the dispersal of manganese dusts.

Dr. Neal's paper was discussed by Drs. M. A. Brown and A. G. Cranch.

### Wednesday Luncheon Session

**A**S USUAL, committee reports of the Industrial Hygiene Section were given at this luncheon session.

**M**R. J. J. BLOOMFIELD, Secretary of the Section, gave a short resume of the progress of the Section.

**D**R. A. J. LANZA, speaking for Dr. R. R. Sayers, Chairman of the Committee on Pneumoconiosis, gave a short resume of the work of that committee.

**D**R. LOUIS SCHWARTZ, Chairman of the Committee on Skin Irritants, stated that an abstract of the literature for the past five years will soon be available through the U. S. Public Health Service.

**D**R. HENRY F. SMYTH, Chairman of the Committee on Anthrax, gave a short report regarding the increase of anthrax in certain states.

**D**R. EMERY R. HAYHURST, Chairman of the Committee on Standard Methods for the Examination of Air, spoke for Mr. Yaglou regarding the Subcommittee on Atmospheric Conditions.

**D**R. FREDERICK H. GOLDMAN, Chairman of the Subcommittee on Chemical Methods in Air Analysis, stated that carbon monoxide estimation methods are now being studied by the subcommittee.

**M**R. J. J. BLOOMFIELD, Chairman of the Subcommittee on Dust Methods, stated that two reports have been previously published and that the third is now ready. The methods have been reviewed and discussed and although no radical changes have been made, some improvements have been possible.

**D**R. WILLIAM F. WELLS reported for the Subcommittee on Bacterial Contamination of Air.

**D**R. WILLIAM P. YANT reported for Dr. Robert A. Kehoe, Chairman of the Committee on Lead Poisoning, stating that the problems now being considered were those of exposure, diagnosis, and medicolegal phases.

After the introduction of foreign guests, the luncheon session concluded.



### Thursday Morning Session

**T**HIS was a joint of the Industrial Hygiene and Public Health Nursing Sections.

MISS VICTORIA C. STRALCO presented the first paper on "Difficulties in Keeping the Industrial Nurse in Small Plants in Touch with Public Health Nursing."

Industrial nursing has proceeded from practically nothing to a very highly specialized field. There seems to have been some misunderstanding between the application of public health nursing and industrial health nursing.

The employer does not usually have a definite idea of the functions of the nurse, but nevertheless the nurse can make her department indispensable.

Voluntary membership in various groups has apparently not been a successful procedure. Furthermore, there have been no official or professional standards set up for the industrial nurse.

The Indiana Nurses Association has sent out 175 questionnaires to industrial nurses, of which 60 were returned. Most of these nurses were recruited from private nursing and hospital groups; practically none had had public health training.

Mere technical training is not a real qualification according to industrial principles. The logical thing to do is to plan programs for the industrial nurse.

The nurse in the small plant is particularly unsupervised; most of the time she works alone and it is, therefore, easy to satisfy the uninformed employer. An official agency of some sort should supervise industrial nurses.

Nurses frequently assume a secretive attitude on even general subjects, and this naturally has a bad reaction on employees.

In the main, experiences have shown that employers are very cooperative.

Finally, the industrial nurse must be prepared to give more help and guidance and must herself receive more; there must be an interest stimulated in important problems which promote industrial nursing; the nurse must also be placed in her proper position in industry.

**M**ISS RUTH W. HUBBARD discussed the subject "The Use of Existing Visiting Nurse Associations in Industrial Service for Small Plants."

There has been a change from the first aid approach to the industrial hygiene approach at the present time.

In the experience with visiting nurses' association appointees in industrial work, there have been industrial health programs which have followed the essentials as they are now known.

In the experience of the visiting nurses association of Philadelphia in eight years, the team system was used and in this group, it was fortunate that industrial physicians were able to supervise the work. The time schedule was so arranged that either the physician or the nurse was present at the plant every day. Understudies were pro-

vided and agreements were made on hours and cost with the plant, based on demonstrated need for services. The work with reference to five plans under this system was reviewed.

With reference to the supervision of the correction of physical defects, the financial obstacle was found to be the chief difficulty; loan funds have been established in some instances to meet such problems.

Close relationships must be established with community hospitals and laboratories of the health department.

The successful nurse must be a "particular kind of person." Training has been given through the visiting nurses association in Philadelphia; special supervisors are appointed to coordinate the activities of industry, the association, and the industrial physicians. There are staff conferences with physicians and special meetings for the study of improvements in the industrial health program.

It is quite evident that a sound service can now be offered and further extension is the present problem. This can probably be done through the industrial hygiene units, safety councils and other similar groups.

In conclusion, it is expected that further work with visiting nurses associations will be done in other parts of the country.

**D**R. T. LYLE HAZLETT presented the subject "Opportunities of a Nurse in the Control of Occupational Health Hazards in the Small Plant."

There has been a great deal of progress made in the past which must meet with considerable chemical application with respect to the solution of health hazard problems in the small plant, in the future. Industrial nursing will form an integral part of this program.

There has only been concerted effort along industrial health lines within the past 25 years, for economic reasons very largely.

There should be a very wide public health approach to the control of industrial disease. Social, as well as industrial causes are contributing factors. There is after all here a science of humanics.

The lack of educational facilities must be realized; courses are almost entirely absent from medical and nursing schools.

The nurse performs the role of a real listening post. If in addition she knows jobs and materials she will be invaluable. The industrial nurse has come to be a great factor in the building of morale.

As to certain specific problems, a great deal can be done with reference to skin irritation in industrial groups, particularly by controlling the exposures. Records are likewise one of the problems in which the nurse must help; training of employees and education of them in many different phases can likewise be accomplished by the nurse.

Industrial nursing, therefore, offers a challenge to a role which cannot be played by any other professional group today.

**D**R. RUSSELL B. ROBSON concluded the session in presenting a paper on "Health Maintenance in a Group of Small Industries."

An outline of the medical service in a small plant of less than 500 employees was presented.

In a foundry experience in 1906 it was found that 2.6 days were lost per man per year on account of sickness and 0.7 days on account of accidents. These figures were respectively 2.8 and 1 in the year of 1907. In the meantime, a nurse had been employed and in 1938, the figures were 0.89 and 0.42 respectively.

A painstaking pre-employment examination is done and a sincere attempt made to fit the man to his proper job. An x-ray of the chest is also a part of the examination.

The nurse visits the employees in the home and a record is made for future reference in her own file, which is not for the use of the management.

The principle on which the service is run is that which governs tuberculosis clinics, the idea being to prevent tuberculosis rather than to treat it.

The nurse is present in the office during the afternoon (at the foundry) and many questions bothering employees are settled here, as well as on home visits.

It has been found rather important to do periodic examinations at the doctor's office rather than at the plant.

An important point also has been that absences are checked as to the real cause.

A physician visits the plant at staggered hours, inspects the plant on different occasions and becomes acquainted with the foremen. A plant walk is taken once a month with the plant manager.

The cost has been figured out to be \$10.00 per man per year exclusive of accidents, including the services of a part-time doctor and the services of a full-time or part-time nurse.

The physician must be on good terms with the manager of the plant. This is one of the prerequisites for a good service.

It has been the custom in this organization to employ silicotics as long as they are undischarged and as long as they do not develop tuberculosis.

In conclusion, the physician must maintain good relationships between the industry and his community.

Dr. Robson's paper was discussed by Drs. A. J. Lanza, K. E. Markuson, Louis Schwartz, and H. H. Kessler.

Services for the small plant located in a small or in a large community necessarily call for a different approach according to the size of the community. There has been a census of small plants made by the National Association of Manufacturers and there has been considerable work with the medical societies by the American Medical Association. Possibly a census of industrial nurses may be needed. It will also be necessary to carry on a campaign of education for physicians with respect to the proper role of industrial nursing. Certainly minimum standards are needed for

industrial nurses, and possibly this might be a problem for the Committee on Professional Education of the American Public Health Association.

The matter of records being confidential is very important.

Properly kept records and adequate records are probably one of the greatest difficulties which are encountered in small plant groups and which should be of considerable interest to the plant nurse.

It was emphasized that there are four important things for the employed group, namely income, housing, nutrition, and work. These are the fundamentals about which so many of the problems of industrial medicine and nursing center.

#### Friday Morning Session

**D**R. JAMES W. BALLARD discussed the subject "Quantitative Analysis by X-ray Diffraction: Determination of Quartz."

The first part of the discussion centered around recent additions to the technique of diffraction analysis of quartz and the importance of knowing the quartz content of various types of dust.

It was believed that the x-ray diffraction method would be the preferable method in the future.

The principal of crystal striations and its adaptation to the problem of determining quartz were explained. Lantern slides were used in showing the photographic lines for different substances as shown. In these photographic lines, quartz corresponds to what is known as the 3.35 Angstrom plane.

The internal standard method, so-called, is applied in the spectographic examinations.

Because a homogenous sample is necessary for proper results, special grinding methods have been devised, which were illustrated by lantern slides.

Another important principle of the procedure is the proper selection of films and filters.

Patterns for 60%, 40% and 20% quartz were shown in the lantern slides used to illustrate the talk.

An electrical measuring apparatus has been devised which makes a graph of the density of the lines and a working curve can then be plotted from the graphs of the density of the absorption lines thus obtained.

The advantages of the method in its adaptation to industrial hygiene studies is a positive identification of quartz; only a small sample of material is needed for the analysis; the results are not affected adversely by small particle size of the dust sample; and the method is a rapid one.

DR. H. H. SCHRENK, co-author of the paper, discussed very briefly some of the important findings in this type of method and its application to industrial hygiene.

**M**R. P. GUMAER presented a paper on "Ventilation Problems in Industrial Hygiene."

Early studies in industrial hygiene engineering were mentioned and the development of the field and its important relations were discussed.

The work of the American Society of Heating & Ventilating Engineers and its eight technical subcommittees concerned with physiological problems was mentioned as being an invaluable contribution to our present knowledge on the subject of modern air-conditioning. Similarly the work of the American Standards Association was mentioned with respect to standards.

It is recognized that without proper units of measurement, the engineer is greatly handicapped and also that the determination of vapor concentrations in workroom air is not always a practical procedure.

A table was, therefore, shown on a lantern slide, giving the molecular weight of the substance, the safe concentration in parts per million, the weight in pounds per gallon at a temperature of 25° C., the cubic foot of vapor per gallon at 25° C., gallons per 1000 cubic feet at a safe concentration, and the ounces of liquid per 1000 cubic feet of air (25° C.) at a safe concentration.

The author believed that this table illustrates the method of expressing a borderline concentration where exhaust ventilation becomes necessary.

The important factor is to express the quantity of toxic material that may be safely used, in such terms as may be readily understood by the factory foreman or the safety inspector. This is especially important where there are so-called small users of these various types of solvents or other similar materials.

A marked improvement in industrial hygiene ventilation is expected during the next 20 years, which will result in a continued reduction of occupational disease cases. In attaining this objective, however, cooperation of the medical and the engineering professions and further research by both is essential.

The following points were emphasized, in closing: (1) codes of maximum allowable concentrations are very desirable, they should be based on factual data; (2) maximum allowable concentrations apply to the prevention of chronic poisoning and should not be confused with relative toxicity which applies only to acute poisoning; (3) it is desirable to express the amount of toxic solvents that may be safely used without exhaust ventilation in terms readily understood by factory foremen or safety inspectors; (4) future development and increased use of automatic control equipment and automatic alarms for unsafe gas or vapor concentrations are indicated; and (5) further development and use of direct reading indicating instruments for toxic materials will materially reduce the hazards of industrial poisoning.

DR. W. J. McCONNELL, in discussing the presentation by Mr. Gumaer, stated that he had given a good review of the present situation. We can look forward to the development of instruments for direct use in evaluating various types of air pollution. Industrial hygiene in general has created a new interest and a new market for ventilation equipment. Such equipment, however, needs careful inspection and maintenance. It

should also be kept in mind that standards are very difficult to make.

DR. M. B. JACOBS, in continuing the discussion, stated that only licensed persons were permitted to use industrial hygiene instruments in Great Britain. Attention was also called to the different figures in Lehmann and Fleury with respect to maximum concentrations of toluol and benzol.

In closing the discussion, Dr. Albert Gray and Mr. Warren Cook were particularly concerned about the tabulations which were presented by Mr. Gumaer and questioned the practical use of such data by the average factory superintendent or foreman.

MR. W. P. YANT closed the Industrial Hygiene Section meetings by presenting the last paper on the program on "Field Instruments and Methods for Rapid Determination of Air-Borne Contaminants."

At the very outset, Mr. Yant emphasized two very important points which must always be kept in mind, namely (1) the taking of what is called a representative sample (which presents many difficult factors); and (2) the treatment of such samples in such a way that the results will be applicable to the specific problem presented.

There was considerable discussion of methods, containers, types of collectors, indicators, recorders, and various other classes of equipment.

It was stated on good authority that measurements of flammable substances now present a very favorable situation as far as accurate results are concerned.

In the health field, it is important that we have methods which can measure micro amounts and that the measurements will be specific for the different substances which are being estimated. There is also a considerable need to combine the measuring methods, so that it will be possible to measure more than one type of substance by a specific method of determination.

Mr. Yant also made some predictions with regard to types of future apparatus, emphasizing particularly the utility of what is known as an oxygen recorder. It is upon similar principles that other apparatus can be built for direct application to industrial hygiene problems.

Another instrument which is going to have considerable application in the near future is one which has been based upon the principle that invisible gases can be made visible by using certain types of light or radiation. This had reference particularly to the devising of an instrument which is now being manufactured for the measurement of various types of vapors, particularly trichlorethylene; it also meets application for the measurement of other types of vapors. Quantitative measurements are possible with this kind of apparatus.

The outlook, therefore, for the future is very favorable for the development of additional equipment which will permit direct measurements of the important substances which are used or are by-products in various manufacturing processes.

# Air Hygiene Foundation

—Fifth Annual Meeting—

Reported by J. R. GARNER, M.D.

**T**HE FIFTH ANNUAL MEETING of the Air Hygiene Foundation of America, Inc., was held at the Mellon Institute, 4400 Fifth Avenue, Pittsburgh, Pennsylvania, on Tuesday, November 12, 1940, and Thursday, November 13, 1940.

The sessions began at 9:30 A.M. and continued throughout the day with recess for luncheon.

The program was as follows:

**Tuesday, November 12, 9:30 A.M.**

**OPENING** — ROGER A. HITCHINS, Chairman, Board of Trustees.

"Industry and the National Emergency" — DR. E. R. WEIDLEIN, Director, Mellon Institute, Head, Chemical and Allied Products Division of Advisory Commission, Council of National Defense.

"Foundation Activities In 1940"—H. B. MELLER, Managing Director.

"Review of Recent Occupational Disease Legislation"—THEODORE C. WATERS, Legal Committee, Chairman, Maryland Occupational Diseases Commission.

"Report of Preventive Engineering Committee"—PHILIP DRINKER, Chairman, Preventive Engineering Committee, Harvard School of Public Health.

Foundation Researches, Harvard University—By B. T. TEBBINS — (a) "Control of Fumes Rods"; (b) "Significance of Particle Size in Silicosis."

By LESLIE SILVERMAN — "Design of Lateral Exhaust Hoods for Industrial Tanks."

"Report of Medical Committee"—DR. A. J. LANZA, Chairman, Medical Committee, Assistant Medical Director, Metropolitan Life Insurance Company.

"Foundation Study of Sick Absenteeism in Industry"—DR. W. M. GAFAER, Senior Statistician, U. S. Public Health Service.

"Foundation Research at the Saranac Laboratory"; "Industrial Susceptibility to Toxic Dusts" — DR. LEROY U. GARDNER, Director.

"Foundation Research at University of Pennsylvania"; "Further Developments in the Study of Effects of Toxic Materials on Living Tissues as Observed in the Living Mammal"—DR. ELIOT R. CLARK, Professor of Anatomy.

**Wednesday, November 13, 9:30 A.M.**

**SYMPOSIUM** — "Industrial Health Defense," PHILIP DRINKER, Presiding.

"Activities of U. S. Public Health Service in the Defense Program"—DR. P. A. NEAL, Acting Chief, Divn. of Industrial Hygiene, National Institute of Health.

"Health of Electric Arc Welders in the National Defense Program"—DR. CAREY P. McCORD, Director, Industrial Health Conservatory Laboratories.

"Industrial Hygiene and the Navy in National Defense"—CAPT. ERNEST W. BROWN, (MC) USN, Navy Yard, New York.

"Absorption and Excretion of Volatile Solvents"—DR. HOWARD W. HAGGARD, Yale University.

"Health Requirements on Government Contracts, Including Importance of Good Working Standards in National Defense, and Health Requirements under the Walsh-Healy Act"—L. METCALFE WALLING, Administrator, Divn. of Public Contracts, U. S. Department of Labor.

"Protection of Civilians in War"—W. P. YANT, Mine Safety Appliances Co.

Report of Membership Committee — C. E. RALSTON, Chairman, Membership Committee, Safety Director, Pittsburgh Plate Glass Co.

Business Meeting. Closed by Chairman of Board.

**Tuesday, November 12, 1940**

**M**R. ROGER A. HITCHINS, Chairman of the Board of Trustees, opened the meeting. Among other statements he said that it had heretofore required from eight to 10 men to be working in the various industries in order to keep one soldier at the front. This was the experience during the world war. Now since mechanization of war it would require a larger number of men engaged in industry to accomplish this same end.

He stated that industry was unanimously in approval of the activities of the Air Hygiene Foundation, and regretted that there were only some 225 members—where there should be more than 2,000. He urged the members to renew their efforts to increase the membership.

**D**R. E. R. WEIDLEIN speaking on "Industry and National Emergency," referred to the fact that health of the employee was common ground with all government employers and employees, and was essential in the enormous national defense program. He said that politics do not enter into any way in the defense program.

Chemistry has become very important, and the Army and Navy are interested in 110 different chemicals. These industry must supply, and yet keep up with the normal demand. He emphasized the necessity of cooperation between industry and the government.

Reference was also made to the fact that cotton linters having become a necessity, helps the farmer and estimated that there was only about one year's supply in storage. He referred to the construction of large storage tanks for gasoline and other petroleum products now under way. Reference was also made to the methods of producing synthetic rubber in the event the natural supply should be cut off. Aluminum is also an essential product taking a large part in the airplane program.

Dr. Weidlein further stated that if labor and the government gave the same cooperation, this country can meet any emergency; and he further stated that industry takes a broad view of all important matters.

**D**R. H. B. MELLER, in reporting on the Foundation's activities for 1940, said that the membership of the Foundation was the same as in 1939. There had been 11 resignations, but 11 new members had come in to take their places.

The numbers of inquiries received by the Foundation were rapidly increasing and came from non-members, as well as members. Also, the number of plant surveys made showed an increase. Reference was made to the unfortunate status of a company which did not know its hazards.

Reference was made to the research conducted at the Saranac Laboratories, Harvard University and the University of Pennsylvania.

The Foundations' services have been offered to the government in connection with its national defense program.

The Foundation's work was stated to cover the entire employee's health.

Owing to the absence of Mr. Theodore C. Waters, the "Review of Recent Occupational Disease Legislation" was postponed until Wednesday and the Report of the Membership Committee, which was on the program for Wednesday, was at this time made by Mr. C. E. Ralston. He also referred to the fact that there had been 11 retirements from the Foundation but that 11 new members had also been taken in, including the Pullman Company. The membership now comprises 225 companies. Plant surveys are made periodically by the Foundation and this service is greatly developing. Through research in industrial health the Foundation is giving a valuable impetus to industry in the protection of the employees' health.

He stated that the National Committee for Conservation of Man-power in Industry, as adopted by our government in connection with the national defense, was a forward movement for the conservation of the health of employees, which he deems to be just as important as the health of the soldier.

**M**R. PHILIP DRINKER, made the "Report of the Preventive Engineering Committee." He stated that one fellowship was being maintained at the Harvard School of Public Health for the purpose of study of gases and fumes.

With reference to silicosis, he stated that the potency of the silica particles increases as the size decreases. He gave an interesting report on the details of animal tests, which was illustrated with lantern slides.

Referring to the various coatings of low carbon steel electrodes, he stated that all coatings contained some form of chloride, usually sodium, and that fluorine and carbon dioxide were to be looked for in the fumes. Slides giving tables were exhibited. He stressed the importance of avoiding the ultraviolet light produced during arc welding, and also the avoidance of confinement without proper ventilation. He stated that nitrogen dioxide which is given off during the process is one of the most important dangerous gases met with in arc welding.

Referring to the matter of exhaust hoods for industrial tanks, he referred particularly to the ventilation requirements necessary in same.

Reference was made to the fact that there was danger of industrial suits arising from employees having latent tuberculosis and who had been exposed to irritant vapors.

According to Mr. Drinker, in the production of silicosis particles larger than 1.7 microns are particularly harmless, and those above 3 microns may be generally disregarded.

At this point adjournment was had for luncheon.

**O**N RECONVENING, Dr. A. J. Lanza presided over the Report of the Medical Committee. He stated that sick absenteeism in industry constituted an enormous economic loss. Reference was also made to the continued research activities at the Saranac Laboratories and to the continued study at the University of Pennsylvania of the effect of toxic materials on living tissues. He reviewed briefly the recent advances in the status of industrial health throughout the country and expressed the desire for recognition of industrial hygiene work in the national defense program.

The need for numerous small industries to work either under or in connection with the larger industries was emphasized.

Mention was made of the fact that the National Defense Council of the Health and Medical Committee includes a Sub-Committee on Industrial Health. In the national defense program physical selection is important in the pre-employment examination of men, and should be most thorough. However, it is recognized that since many of the able-bodied men will be absorbed in military service there will be a necessity for many men having minor or even major defects to be employed in industries during the defense. It is recognized that proper medical supervision may enable industry to continue these men at work. Emphasis was made on the fact that men should not be barred from work but should be helped to do what they are fitted for. The physicians' status in this program was emphasized and the statement made that physical selection and supervision must be maintained.

**D**R. W. M. GAFAFER, reporting on the "Foundation's Study on Sick Absenteeism in Industry," stated that some 15 companies with 60,000 employees had been studied with regard to sick absenteeism and that absences due to sickness of non-industrial origin averaged eight calendar days per year per employee. He alluded to the sick benefit associations and life insurance protection provided in many plants for the protection of employees' lost time during absence due to illness.

**D**R. LEROY U. GARDNER, reporting upon the "Foundation's Research at the Saranac Laboratory," with reference to the "Individual Susceptibility to Toxic Dusts," stated that unquestionably individual susceptibility was present and played an important part. He estimates that about one-fourth of the exposures develop trouble, and states that the higher the concentration of silica, the

greater the development of symptoms. Some individuals manifested advanced stages of the disease on very slight exposure to dust, etc. When there are old scars of tuberculosis in the lungs there is a greater tendency to hold more particles of silica than otherwise. Infection in the lungs may also hold silica and cause a disturbance of the lymphatic circulation and elimination. Normal animals vary in the time of manifesting reaction to dust.

Here many slides of both animal and human lungs were exhibited showing the effects of various concentrations of dust therein.

Whether the work so far done can be applied to pre-employment examinations is as yet undetermined, and only problematical. The Saranac Laboratories propose to hold a symposium in the near future on tuberculosis in industry.

**D**R. DARROW HAAGENSEN, presented the topic of "Developments in the Study of Effects of Toxic Materials on Living Tissues." He presented many slides illustrating the various stages following injections of silica. Also a moving picture which showed the effect of silica injected into living tissues.

This closed the Tuesday session.

Wednesday, November 13, 1940

**O**N CONVENING Wednesday morning it was found that Mr. Theodore C. Waters was still unable to attend the meeting and his report on "Review of Recent Occupational Disease Legislation," which had been brought over from Tuesday's meeting, was read by Mr. Dorset. Allusion was made to extensive activity on the part of Federal, state and local governments. Twenty-two states have adopted occupational disease compensation; this does not include Arkansas where legislation has been enacted but has not yet become effective. The Arkansas legislation covers 37 diseases which are made compensable.

New York State has amended its compensation law so as to provide partial disability in dust cases, gradually increasing to a maximum of \$5,000.00 at the rate of \$50.00 per month. Contested claims are to be examined by a commission of three.

Efforts to liberalize compensation laws are generally noted. Several states which have not adopted compensation laws have passed resolutions to study the subject, and 31 states now have units for the study of disease hazards.

There are many legal decisions where claims are made to the effect that impoverished health or disease has originated by accidental means, and has been covered by compensation. In several of these, compensation has been awarded and sustained on appeal—even though medical experts did not agree as to the causation being accidental. He cited a number of cases.

There is a trend of opinion toward a liberalization of interpretation of accidental diseases and their causes.

A comprehensive program is recommended for industrial hygiene.

**D**R. P. A. NEAL, reported on "Activities of U. S. Public Health Service in the Defense Program." He stated that health was an essential element of preparedness and that everything in the preparedness program ultimately results on man power. Rehabilitation of registrants who are disqualified for military service is recommended and it is estimated that among those examined at least 25% would be found defective. Of the defects noted, 60% are estimated to fall under the category of the eye and ear. A plan for correction of defects so that these men may be employed in industry is recommended.

The health of territories surrounding cantonments is both a local and national problem, as upon it depends the protection of our emergency soldiers. Communicable diseases must be given particular attention.

Military expansion will be impossible without industrial expansion.

Many workers handle substances which, if improperly handled, cause dermatitis.

Dr. Neal estimates the loss from sickness during the year to be at least 10 days per person.

Mention is made of the fact that replacement of employees drafted into service must of necessity be persons who are defective physically, older persons, and possibly even women.

Fatigue problems are increased due to increased production.

A program for coordination of local state and Federal industrial hygienic service is recommended in order to maintain a healthy condition of industry and healthy workers.

**DR. CAREY P. McCORD**, speaking on the "Health of Electric Arc Welders in the National Defense Program," states that there are 200,000 welders in the United States, all of whom are subject to potential exposure. He notes that in every passenger automobile there are at least 5,105 welded points.

The dangers are from gases produced by the electric arc and from the ultra-violet ray. Aside from this the health of arc welders is not different from that of other metal workers.

Ozone is produced close to the arc and is found in from 10 to 32 parts per million at a distance from one to five inches. At a distance of one foot there is only one part per million. Tests for carbon dioxide have shown that this is not found in a dangerous amount. A low voltage in welding is recommended as being productive of less gas.

The dangers of arc welding have been greatly exaggerated. The greatest danger present is that of ultra-violet rays and this is limited.

**DR. ERNEST W. BROWN**, Captain M. C. USN., made a report on "Industrial Hygiene and the Navy in National Defense." He went into the organization of the Navy Yards, giving a general outline of same and stated that 90% of the activities in the Navy Yards is of an industrial nature. The industrial hygiene of the Navy Yards has to do with first, occupational health control and, second, hazards in the Navy Yard.

Non-industrial accidents are found to be about four times more prevalent than industrial accidents.

**DR. HOWARD W. HAGGARD**, presented a paper on "Absorption and Excretion of Volatile Solvents." He called attention to the fact that the blood exchanges with all the tissues of the body and can carry poison to these tissues. Alcohol affects the brain tissues but has little or no effect on other tissues—excepting when its use is long continued. He states that man can select what he swallows but he has no control over what he breathes through the respiratory system. The respiratory system on the other hand is especially well adapted to the absorption of volatile substances and the entire area exposed within the lungs is estimated to be 80 square yards of surface.

The membranes of the air ducts are very delicate and as a protection inhaled air is warmed before reaching the lungs.

If elimination is less rapid than absorption, cumulation takes place in the system.

At this point, recess for luncheon was taken. Following luncheon, the program was resumed.

**MR. L. METCALFE WALLING** spoke on "The Walsh-Healey Public Contracts Act." He stated that we cannot permit the large losses which industry is now sustaining on account of deaths and other causes to continue. Most industry is on a 40-hour per week basis. Under the Act, all government contracts of a value of \$10,000.00 or more require that the industry receiving these contracts shall adhere to the 40-hour law. The Division of Public Contracts of the US Department of Labor has handled over 30,000 contracts in the past four years.

Important features of the requirements under the Act are: An eight hour day, 40 hours per week, pay and one-half for overtime; minimum wages in accordance with prevailing rate of pay. No child labor and no convict work.

Industrial hygiene and good working conditions mean

safety. Most states have no safety requirement laws and only one-third of the states attempt to keep accurate records of safety and industrial hygiene. All companies must meet reasonable standards of safety and vigilance is demanded of all connected with industry. Safety committees have been appointed for the various regions with a view to adopting uniform safe conditions and hoping to develop a nationwide system of employment exchange. It is estimated that in the United States there are 5,600,000 industrial reciprocals.

Production must not be content until we have less than 16,000 industrial deaths per year.

Up to the present it has not been necessary to use the teeth of the Law in order to enforce the Act, but Mr. Walling calls attention to the fact that the teeth are present if needed.

The Commission has not laid down any requirement for physical examinations.

There have been very few complaints from labor against the administration of this Act; however, there have been many violations.

Non-industrial causes are responsible for 15 times more labor loss than are industrial causes.

**MR. W. P. YANT** spoke on "Protection of Civilians in War." He referred to the dangers as being gas, shells and pieces of shells, falling walls, machine gun fire, fatigue (due to loss of sleep) and influenza. The means of protection suggested are as follows:

For gas attacks—masks.

For blistering gases—clothing, etc., and gas-tight shelters.

High explosive—shelters and barricades; and it is suggested that 100 cubic feet of air per person in a tight room will be sufficient for 12 hours.

The report of the Membership Committee had been presented during the Tuesday morning program.

Following the above, the meeting adjourned and the members of the Foundation entered upon a business meeting.

## Symposium

### —on Industrial Public Health Nursing Services—

**A** SYMPOSIUM on Industrial Public Health Nursing Services, sponsored by the State Board of Health and the industrial nurses of Wisconsin, will be held on Thursday, Friday and Saturday, February 20, 21 and 22, 1941, at Hotel Wisconsin, Milwaukee.

The cooperating agencies are: Wisconsin State Nurses Association, Wisconsin State Medical Society, University of Wisconsin, Wisconsin Industrial Commission, Wisconsin Association of Manufacturers, Marquette University, Wisconsin Anti-Tuberculosis Association, Milwaukee City Health Department, Milwaukee Association of Commerce, Industrial Relations Association, and Employers Mutual Liability Insurance Company of Wisconsin.

The program is as follows:

#### Thursday Morning

**GENERAL CHAIRMAN**—PAUL A. BREHM, M.D., Supervisor, Industrial Hygiene Unit, State Board of Health, Madison.

9:00-10:00—Registration (no fee). Hotel Wisconsin, Milwaukee.

10:00—Address of Welcome, MAYOR CARL F. ZEIDLER, Milwaukee.

10:15—"Relationship of the Nurse in Industry to the Physician"—DR. STANLEY J. SEEGER, Milwaukee.

10:40—"The Responsibility of the Industrial Nurse in the Efficient Administration of a Compensation Law"—B. E. KUECHLE, Vice President, Employers Mutual Liability Insurance Company, Wausau, Wisconsin.

11:00—"The Responsibility of the Nursing Profession in Industrial Hygiene"—J. J. BLOOMFIELD, Sanitary Engineer, United States Public Health Service, Washington, D. C.

12:30—LUNCHEON, Hotel Wisconsin.

#### Thursday Afternoon

**PRESIDING CHAIRMAN**—HARRY A. NELSON, Director of Workmen's Compensation, Industrial Commission, Madison.

2:00—**PANEL DISCUSSION:**

"After the injury—What?"

Participants:

Physician—DR. MERRITT JONES, Wausau.

Rehabilitation—MISS MARJORY TAYLOR, Director, Curative Workshop, Milwaukee.

Nurse—MRS. OMILEE D. BRALFORD, R.N., Beloit Iron Works, Beloit.

Industrial Relations—J. J. PLAZAK, Director Industrial Relations, Consolidated Water Power & Paper Co., Wisconsin Rapids.

3:00—"Dental Program in Industry"—DR. ERNEST W. MILLER, The Milwaukee Electric Railway and Light Co., Milwaukee.

4:00—**DISCUSSION**—30 minutes:

6:30—**DINNER**—DR. C. COPELAND SMITH, National Association of manufacturers, New York, Guest Speaker.

#### Friday Morning

**PLANT VISITATION:**

The Milwaukee Electric Railway and Light Company, Medical Department.

Curative Workshop.

Globe-Union Manufacturing Company.

Discussion, DR. E. L. BELKNAP, Medical Consultant.

#### Friday Afternoon

**PRESIDING CHAIRMAN**—DR. WM. S. MIDDLETON, Dean, The Medical School, University of Wisconsin, Madison.

1:30—"The National Defense Program and the Industrial Worker"—HARRY GUILBERT, Director Bureau of Safety and Compensation, The Pullman Company, Chicago.

2:00—"Relationship of Cardio-Vascular Diseases to Accidents"—DR. NORBERT ENZER, Milwaukee.

2:45—"Dermatitis Control in Industry"

Medical Control—DR. M. J. REUTER, Milwaukee.

Engineering Control—E. G. MEITER, Ph.D., Employers Mutual Liability Insurance Company, Milwaukee.

3:30—"Cancer Control"—DR. M. FERNAN-NUNEZ, Professor of Pathology, Marquette University, School of Medicine, Milwaukee.

4:00—**DISCUSSION.**

7:30—Refreshments and entertainment—Fabst Brewery, Fabst Blue Ribbon Hall, 9th and Juneau Avenues.

#### Saturday Morning

**PRESIDING CHAIRMAN**—DR. J. A. CARZWELL, Association Executive Secretary, Wisconsin Anti-Tuberculosis Association, Milwaukee.

9:00—**PANEL DISCUSSION:**

"Community Resources as They Concern the Nurse in Industry"

MISS CORNELIA VAN KOOY, R.N., Supervisor, Public Health Nursing, State Board of Health, Madison.

DR. E. R. KRUMBIEGEL, Commissioner, City Health Department, Milwaukee.

MISS CAROLINE DI DONATO, Instructor, Public Health Nursing, College of Nursing, Marquette Milwaukee.

MISS CLARA B. RUE, Associate Director, Visiting Nurses Association, Milwaukee.

MISS META BEAN, Wisconsin Anti-Tuberculosis Association, Milwaukee.

MISS LOUISE ROOT, Executive Secretary, Council of Social Agencies, Milwaukee.

10:30—"Absenteeism in Industry"

DR. R. D. MUDD, Medical Director, Chevrolet-Grey Iron Foundry, Saginaw, Michigan.

W. G. HAZARD, Personnel Division, Owens-Illinois Glass Co., Toledo, Ohio.

11:15—"The Challenge to the Nurse"

MISS PHOEBE BROWN, R.N., Chairman, Industrial Nurses Section of the 4th and 5th District. Employers Mutual Liability Insurance Company, Milwaukee.

## Dermatology and Syphilology

Review by

WM. D. McNALLY, A.B., M.D.

**MODERN DERMATOLOGY AND SYPHILOLOGY.** By S. WILLIAM BECK and MAXIMILLIAN E. OBERMAYER, J. E. Lippincott Company, 1940, 871 pages, 461 illustrations, 32 full color plates, price \$12.00.

THE text consists of 871 pages including an index of 22 pages, clear type, printed on a good quality of paper. Six hundred and fifty-two pages are devoted to diseases of the skin, 187 pages to various phases of syphilis.

Diseases discussed are those commonly seen in the United States, Canada, and Great Britain, and those more rarely seen. Tropical diseases encountered occasionally in coastal towns, are not described. The subject matter is presented in the manner of a lecture rather than in encyclopedic form making the text more readable. A table presenting a cross section of cutaneous lesions, enables the student of dermatology to visualize at a glance, the significance of the terms designating primary and secondary lesions.

Arrangement of the material has been made from the functional viewpoint. When this form is found impracticable in certain phases, the dermatoses are grouped according to common etiology (infection), or based on diagnostic considerations (papulosquamous eruptions). Diseases of the appendages are considered separately, as are those of the mucocutaneous junctions and mucous membranes.

In Chapter IV, 20 pages are given to therapy and formulae. Therapeutic preparations are arranged alphabetically facilitating reference to them from the various portions of the text when they are recommended. A chapter is devoted to the various aspects of dermatoses encountered in different occupations. A table of substances which may produce dermatitis, is given. The author in this chapter, however, does not mention that several hundred cases of dermatitis and depigmentation of the skin have occurred from the wearing of rubber gloves. A number of these cases have been described in the October, 1939, issue of INDUSTRIAL MEDICINE. Diagnosis of dermatitis as of occupational origin, is not easy for the industrial physician nor the dermatologist. The eruptions must be differentiated from eczema, dermatitis of non-occupational origin such as neurodermatitis, seborrheic dermatitis, lichen planus and many others.

Methods of investigation with tabulated percentages of substances used by patch tests are given. The intimate association of syphilology with dermatology has led the author to devote a considerable space to the history, nature, cause, mode of transmission, treatment, and social aspects of syphilis. The author has attempted to give a comprehensive viewpoint of syphilis as an infectious disease, including all information necessary for the practice of everyday syphilology.

The text in its entirety with the colored plates of cutaneous disorders and the many other illustrations, is one of the best on the market and can be highly recommended for the library of the industrial, as well as the practicing physician and surgeon.