

# Dominion Medical Monthly

And Ontario Medical Journal

Vol. XLVI.

TORONTO, MAY, 1916

No. 5

## Original Articles

### THE PHYSICIAN IN INDUSTRY

BY MAGNUS W. ALEXANDER.

In the early history of medical work in industry the regular employment of a physician in an industrial establishment was usually considered an evidence of a largely benevolent attitude on the part of the employer. Whether or not this assumption was true, the results showed that the work of the physician in industry proved beneficial to the employer as well as to the employee, by protecting both against undue expense arising out of injury and sickness and by promoting a better mutual relationship. The results also proved that medical supervision of employees increased their efficiency, and that prompt medical and surgical treatment of injured and sick employees prolonged their lives and the period of their industrial usefulness. As these advantages became known among employers, medical supervision of employees was introduced into many plants, particularly into establishments where large numbers of workmen were employed.

The great value of the physician in industry became even more generally realized when workmen's compensation laws went into effect, which compelled the employer to shoulder the expense of injuries to employees regardless of the fault of either party. These laws forced the employer, in self-defence, not only to provide adequate medical and surgical treatment for employees injured in his establishment, but also to exert all reasonable effort for the prevention of future accidental injuries and for the elimination of working conditions that might prove harmful to the health of his employees. Experience, however, had shown that physique, temperament and general physical condition of employees affected to a large extent their liability to sickness or injury. Some men could safely do work that constantly required considerable physical effort, while the same work would cause discomfort and strain to



other apparently strong men. Employees with defective vision would suffer headache while doing work that required close application of their eyesight, while others with normal vision would naturally have no such trouble when similarly engaged. Contact with certain odors or liquors used in manufacturing processes would cause skin irritation or other disturbances to one person, while hundreds of others working under exactly the same conditions would be entirely unaffected.

These experiences naturally led the employer toward a study of the physical condition of his employees, in order to direct each of them into that kind of employment for which he would seem best suited by virtue of his physical fitness as well as his experience and skill; and *vice versa*, to divert him from an employment that might prove injurious to his health and safety. In order to pursue this course intelligently, physical examination of all prospective employees and periodical re-examination of all persons already employed became necessary. It is obvious that only a competent physician should be assigned to this task.

Aside from looking after the health of individual employees, the physician in industry also renders a valuable service by bringing to light those general conditions of employment that may adversely affect the health and comfort of all workmen in common. Many of these conditions would otherwise remain concealed and unremedied because their ill effects are of such gradual development that the lay executive or employee might not be able to detect their presence nor locate their source. By his co-operation with the employer and foremen in securing wholesome ventilation and proper lighting conditions, and by inducing employees, by personal advice or through suitable literature, to adopt healthful habits in the shop and home, the physician brings into play simple, far-reaching measures that tend to raise the health and therefore the efficiency standard of the entire working force.

#### THE TRAINING OF FIRST-AID MEN.

The physician also finds specific functions to perform, such as the training of an adequate number of persons in each employment, so that they can themselves as laymen effectively treat slight wounds that do not demand a physician's service, or give temporary assistance in cases of serious injuries that need emergency attention pending a physician's arrival. The presence of such a body of trained first-aid men is so much the more important when the industrial establishment is located at a considerable distance from

the physician's office or dispensary, or when injuries occur when a physician is not immediately available.

With these many advantages in mind it is obvious that the physician has come into industry to stay. In a large plant he becomes part of the organization and devotes his entire time and effort to the welfare of its employees, while in smaller plants or in those where the work is practically free from hazard, he spends only a part of the day in the medical care of employees, or he combines a number of such plants under his medical supervision. Apart from the medical aspect, however, enlightened employers are beginning to see quite clearly the value of a physician as a staff member. They have learned to appreciate that his peculiar relationship to employees as a friendly medical advisor enables him to exert a wholesome influence upon their mental attitude as well as upon their physical welfare. It should therefore not be surprising to find in future physicians regularly attached to the organization of even small plants, where the medical supervision of employees alone would not be a task large enough to warrant the full-time employment of a medical expert, but where his spare time may be used effectively in assisting the management in the general supervision of employees.

#### SPECIAL TASKS AND PROBLEMS.

The physician in industrial practice encounters a great many tasks and problems that do not arise ordinarily in private practice. He often finds himself dealing with a great number of people whose needs must be met promptly, effectively and with a minimum expenditure of time. Many of these are unfamiliar with the English language and are unable to make their needs and wishes understood or to understand the inquiries and directions of the physician who speaks English only; others are mentally backward and difficult to deal with on that account. Some are unclean and careless in their personal habits, thereby causing their wounds or ailments to improve only very slowly even under the best of care, while others have a generally antagonistic attitude. Some are even dishonest and try to conceal or falsify the real cause of an injury; they would rather feign inability to work and secure part pay while loafing, than perform honest work and gain full wages. Moreover, there are those who themselves believe or by some doctors are led to believe, that they are seriously injured and incapacitated for work when they are not. Yet the physician in industry must patiently and persistently cope with all these con-

ditions in his endeavor to cure these people of their physical ailments and to disabuse them of their mental illusions.

The question of where the physician in industry should terminate his care of injured or sick employees and at what point an employee's private physician should assume such responsibility, is another problem that must be solved in a satisfactory way. What duties to delegate or not to delegate to the nurse employed in the establishment under his supervision; what instructions to give and what materials to furnish to laymen authorized to render first aid or emergency treatment to injured employees throughout the plant; how best to render some industrial operations free from the hazard of occupational disease, or how to protect workmen against such hazards if they cannot be eliminated, are questions that he is called on to answer in an intelligent and practical manner.

In the solution of these and similar problems the physician in industry often finds himself in a quandary. Previous training and experience had made no specific provision for their solution; in fact, many of these problems have but recently become recognized. In most cases the physician in industry has been obliged to find an answer to each problem practically alone and as best he could. Sometimes he has hit on a method that was only partially satisfactory; sometimes he has achieved results that were all that could be desired, while at other times he has failed in his aim. Occasionally, through a comparison of conditions and an interchange of experiences, physicians connected with industrial enterprises would reach common conclusions that would point to simple and practical remedies. The value of such informal conferences naturally led to a desire for a more systematic interchange of ideas extended over a larger group of physicians dealing with medical problems in industry.

#### THE CONFERENCE BOARD OF PHYSICIANS.

A preliminary meeting of physicians engaged in industrial practice held in New York City on April 4th, 1914, indicated that their varied knowledge and experience could be so combined and harmonized as to afford composite and definite conclusions that would be valuable to themselves and to the industries they represent. It was also felt that the findings could advantageously be made available to all physicians in industry to the end that employers and employees generally might reap benefit therefrom. The concrete outcome of this meeting was the organization of a "Conference Board of Physicians in Industrial Practice," the scope and work of which is embodied in the official declaration that

"The Conference Board of Physicians in Industrial Practice is organized for co-operative effort in introducing into industrial establishments the most effective measures for the treatment of injuries or ailments of employees; for promoting sanitary conditions in workshops; and for prevention of industrial diseases."

In launching this movement, the Conference Board on Safety and Sanitation\* has been a helpful factor, and the two Conference Boards have since been working in close, harmonious relationship; that of business executive looking for professional advice in safe-guarding the health of employees, and that of physicians offering medical judgment as the result of combined study and experience.

It was thought desirable to bring together at first only a relatively small number of medical officers of corporations, so as to facilitate their work and give their discussions a more intimate character. In order to insure regular attendance at the meetings, only corporations in the eastern section of the country were asked to join the Conference Board through their respective medical officers, but industrial representation was diversified as far as practicable. The physicians now constituting the Board are all men of wide experience in their respective fields, who have gained a thorough understanding of the requirements of industry from the humane viewpoint and of the physical ability of men and women generally to meet these requirements. They are also familiar with the personal habits and the living and working conditions of people engaged in industry, and are therefore particularly competent to handle medical problems in industry.

Dr. John J. Moorhead, of New York City, the Chief Medical Officer of the Interborough Rapid Transit Company and the New York Railways Company, is Chairman of the Conference Board, and M. W. Alexander, of the General Electric Company, West Lynn, Mass., is the Executive Secretary. The present members of the Board are: Dr. T. John Bowes, Philadelphia Electric Co., Philadelphia, Pa.; Dr. C. C. Burlingame, Cheney Brothers, South Manchester, Conn.; Dr. W. Irving Clark, Norton Company, Worcester, Mass.; Dr. Royal S. Copeland, Consolidated Gas Co., New York City; Dr. G. M. Dorrance, Joseph Campbell Co., Camden, N.J.; Dr. E. H. Hanna, Cadillac Motor Car Co., Detroit, Mich.; Dr. G. L. Howe, Eastman Kodak Co., Rochester, N.Y.; Dr. W. G. Hudson, E. I. duPont DeNemours Powder Co., Wilmington, Del.; Dr. J. A. Jackson, New York Edison Co., New

\*The Conference Board on Safety and Sanitation is composed of national associations of employers, such as the National Founders' Association, the National Association of Manufacturers, the National Metal Trades Association, and the National Electric Light Association, who have pooled their efforts for industrial safety and sanitation.

York City; Dr. Chas. A. Lauffer, Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.; Dr. Frederick W. Loughran, Medical Advisor, State Insurance Fund, New York City; Dr. D. B. Lowe, B. F. Goodrich Co., Akron, Ohio; Dr. John W. Luther, The New Jersey Zinc Co., New York City; Dr. A. C. Marshall, Powers-Weightman-Rosengarten Co., Philadelphia, Pa.; Dr. J. D. McGowan, Commonwealth Edison Co., Chicago, Ill.; Dr. John J. Moorhead, Interborough Rapid Transit Co., and New York Railways Co., New York City; Dr. Francis D. Patterson, Harrison Bros. & Co., Inc., The J. G. Brill Co., Electric Storage Battery Co., Philadelphia, Pa.; Dr. W. E. Ramsay, The American Smelting & Refining Co., Raritan Copper Works, Barbor Asphalt Paving Co., Perth Amboy, N.J.; Dr. L. M. Ryan, Hudson & Manhattan R. R. Co., The Foundation Co. of N. Y., New York City; Dr. F. E. Schubmehl, General Electric Co., West Lynn, Mass.; Dr. John Woodman, New York Edison Co., New York City; Dr. Randall Zimmerman, Westinghouse Air Brake Co., Wilmerding, Pennsylvania.

The companies represented by these physicians employ over 250,000 men and women, skilled and unskilled, of many languages and nationalities, and working both indoors and out in greatly diversified occupations.

The Board meets periodically. So far eight meetings have been held and some important results have already been achieved; much other work of far-reaching character is now under consideration. The individual members of the Board are actively co-operating in the prosecution of research work in respect to special problems which can be studied best in the particular industry with which they are connected. The results of individual investigations, however, are referred to the Board for broad consideration and joint action.

#### INSTRUCTIONS TO LAYMEN FOR FIRST AID.

One of the first tasks assumed by the Board was the development of "Instructions to Laymen for First Aid Treatment of Common Injuries and Disorders." It was the intention to issue instructions of such simple character that they could readily be followed by the ordinary man without even an elementary foundation of first aid knowledge. The instructions agreed upon by the Board are concise and pertinent; they stipulate what the laymen should do, without wasting any words in stating the reasons for so doing. In an emergency treatment, loss of time by reading irrelevant matter may prove of serious consequence. The remedies

referred to in the instructions are few, simple and inexpensive and can be administered by laymen without danger of any harm. All medicaments, bandages and other materials needed in carrying out the instructions are readily obtainable in drug stores. The first aid instructions promulgated by the Board have been widely accepted; they have also been reprinted in numerous technical journals in the United States and in other countries.

The Board also co-operated in a very practical way with the Conference Board on Safety and Sanitation in the development of the "N. A. S. O. Standard First Aid Jar," a compact, sanitary and convenient first aid outfit consisting of a dust-proof glass jar in which first aid materials are contained in well ordered arrangement. The first aid instructions are printed on the inside of the glass jar cover and are therefore always at hand when needed. These first aid jars have been made readily available to employers and are now being used extensively in industrial establishments, in public institutions and private homes.

#### PHYSICAL EXAMINATION IN INDUSTRY.

The next work of importance undertaken by the Board was the determination of the essential requirements of "*Physical Examination*" in industry generally. This subject was given careful study with a view of arriving at a standard of minimum requirements and records which could be used in connection with practically all employments, or with such additions as the nature of a special employment would necessitate. The conclusions reached were based on extensive observation and experience in industry, through which it had been learned what physical ailments and what degree of such ailments would interfere with the well-being, efficiency and safety of the employees at work. The Board agreed upon the various defects requiring attention in physical examinations, and the various degrees of such defects, on the basis of which the suitability of an individual for a specific employment can be determined. The Board also standardized a "*Physical Examination Record Card*" of convenient size and so arranged that a sufficiently clear and comprehensive record can be made with a minimum amount of clerical work. These record cards have already been used in thousands of cases with entire satisfaction.

The Board gave special attention to methods of "*Artificial Respiration*" of persons rendered unconscious by electric shock or by asphyxiation from water, smoke or gas. The Board expressed itself unanimously in favor of the manual prone pressure method by persons specially instructed therein, but it also agreed

that when mechanical devices for artificial respiration are used they should be used principally as auxiliary means and then only by specially instructed laymen or physicians.

Realizing that all efforts for sanitary conditions in workshops and for clean personal habits of persons while at work would be brought to naught if the persons themselves would not make similar efforts in respect to their homes and their personal habits outside the workshop, the Board decided to prepare a set of "*Health Hints*" of prophylactic character, written in simple, concise and direct language, so that they can be readily understood by the average person. The Care of the Teeth, the Care of the Eyes, the Healing of Wounds, the Value of Proper Breathing, the Danger of Promiscuous Spitting, the Cause of Headache and of Kidney Trouble; these are some of the subjects on which the Board has prepared statements which are intended to be printed, each on a separate leaflet, for wide distribution among employees generally.

#### STUDY OF OCCUPATIONAL DISEASES.

The Conference Board has also entered into a careful study of diseases peculiar to certain occupations, with a view of learning the most effective treatment of such diseases and the best methods of reducing or entirely eliminating their causes. Some members of the Board who are connected with industrial establishments in which the nature of the work or the materials used are apt to cause such diseases, have become experts by special study and extended experience in this field of medical practice. With their assistance and with the help of other invited experts in this field the Board is proceeding cautiously and painstakingly in the study of "*Occupational Diseases*," and expects, in due time, to arrive at and publish definite conclusions.

Another important phase of the work of the Board is the exchange of specific experiences by the members as they encounter special situations in industry, or as they come in practical contact with the administration of workmen's compensation laws. Many of the corporations represented on the Board through their respective medical officers are operating in several States and are therefore subject to more or less widely different workmen's compensation laws and health regulations. The necessity for uniformity in statutory provisions and in their interpretation has therefore been pertinently brought home to the Board and has convinced it of the desirability and need of a standardized nomenclature and definition of medical terms as they relate to industrial work. The Board realizes that progress along these lines will be slow, but it



believes that substantial progress can be made by thorough investigation along broad lines and by close application to the task.

The Conference Board of Physicians in Industrial Practice is unique in character and in method of work. It is a voluntary association of a small number of men engaged in the same field of professional work, who meet in periodic conferences of the most informal character, unfettered by any restricting rules and regulations or by any obligation to abide in their individual work by the conclusions of the Board. Yet the common purpose which brings these physicians together and the absence of such restrictive regulations, has resulted in a most helpful co-operative effort. The work of the Board members, while strictly governed by professional ethics and scientific principles, is given a most pronounced practical aspect from the fact that these physicians in industry have acquired by the nature of their work an industrial viewpoint and understanding that establishes the proper balance between what should be abstractly striven for and what can be correctly accomplished under actual working conditions.

### THE ONTARIO MEDICAL ASSOCIATION

The Ontario Medical Association will hold its Annual Meeting in Toronto, beginning Wednesday, May 31st, 1916, for three days, in the Medical Building, Queen's Park.

The following is the programme:

Wednesday, May 21st.

9.00 a.m.—Registration.

10.00 a.m.—Business Session.

12.00 a.m.—An Organ Recital—Convocation Hall.

2.00 p.m.—General Session.

“Drugs and Medicinal Agents Considered from the Professional, Economic and National Standpoints,” by Prof. A. D. Blackader, Montreal.

Address in Gynecology, by Dr. J. F. Percy, Galesburg, Ill.  
Subject: “Heat Problems, or the Method of Treatment in Cases of Inoperable Uterine Carcinoma.”

“Tonsillectomy, with its General Results,” by Dr. Justus Matthews, Mayo Clinic, Rochester, Minn.

Election of the Nominating Committee.

In the evening at eight: President's Address, by Dr. H. B. Anderson.

8.45 p.m.—The Address in Medicine, by Dr. Elliott P. Joslin. Boston. Subject: “The Treatment of Diabetes.”

On Thursday, June 1st, from nine to twelve o'clock, the Sections in Medicine, Surgery, Obstetrics, and Ear, Eye, Nose and Throat will meet.

Programme in Medicine:

- "Pernicious Anemia," by Dr. Charles McKay, Seaforth.
- "Radium as an Auxiliary in the Treatment of Exophthalmic Goitre," by Dr. W. H. B. Aikins, Toronto.
- "Indications for and Results of Artificial Pneumothorax in Phthisis," by Dr. C. D. Parfitt, Gravenhurst.
- "Duodenal Feeding with Tube," by Dr. Cleaver, New York.
- "Treatment of Constipation," by Dr. Campbell, Napanee.
- "Treatment of Lues in Children," by Dr. George Smith, Toronto.
- "Arterial Hypertension," by Dr. Boyce, Kingston.
- "Wassermann Reaction in Relation to Diagnosis and Treatment of Syphilis," by Dr. Hugh Laidlaw, Kingston.
- "Protozoan Infections," by Dr. L. G. Pearce, Brantford.
- "Syphilis with New Arsenical Preparations," by Dr. Gordon Bates, Toronto.

Programme in Surgery:

- "Appendicitis," by Dr. M. O. Klotz, Ottawa.
  - "Gall-Stones," by Dr. I. Olmstead, Hamilton.
  - "Pyloric Stenosis in Infants," by Dr. W. E. Gallie, Toronto.
  - "Fractures, including Compound," by Dr. Seaborn, London, and Dr. J. M. Rogers, Ingersoll. Discussion opened by Dr. T. H. Middleboro, Owen Sound.
  - "Intestinal Obstruction," by Dr. H. A. Bruce, Toronto.
  - "Renal Calculi," by Dr. W. W. Jones, Toronto.
  - "Conservative Surgery in Injuries of the Hand," by Dr. N. A. Powell, Toronto.
  - "Transfusion," by Dr. F. N. G. Starr, Toronto.
  - "Perforating Ulcer of the Stomach," by Dr. McGregor, Hamilton.
  - "Treatment of Cancer by Fulguration," by Dr. J. E. Hett, Berlin.
  - "The Relative Merits of the Steel Plate and Bone Graft in the Treatment of Recent Fractures," by Dr. E. R. Secord, Brantford.
  - "Pulmonary Abscess following Abdominal Operations," by Dr. Angus McLean, Detroit.
  - "Duodenal Ulcer," by Dr. A. H. Perfect, Toronto.
- Programme in Gynecology and Obstetrics:
- "Treatment of Dysmenorrhea," by Prof. William Weir, Cleveland.

"Morphine and Hyosine in Obstetrics," by Dr. A. Kinnear, Toronto.

"Blood Transfusion in Hemorrhage of the New-Born," by Dr. Alan Brown, Toronto.

"Gelatine in Hemorrhage of the New-Born," by Doctor Mellwraith, Toronto.

"Apparatus Used in Blood Transfusion," by Doctor Unger, New York.

"The Female Pelvic Floor and the Part it Plays in Obstetrics and Gynecology," with moving pictures, by Professor T. H. Morgan, New York.

"Eclampsia," by Dr. J. F. Goodchild, Toronto.

"Diagnosis and Choice of Operations in Retrodisplacements," by Dr. A. C. Hendrick, Toronto.

"Persistent Occipito-Posterior Positions in Relation to the Country Practitioner," by Dr. Charles Page, Oakville.

"The Walcher-Position in Obstetrics," by Doctor Arthurs, Sudbury.

Programme in Section of Ear, Eye, Nose and Throat:

"Foreign Bodies in the Esophagus," with slides, by Dr. Edmund Boyd, Toronto.

"Treatment of the Blind After the War," by Dr. B. C. Bell, Brantford.

"Orthodontia in its Relation to the Nose and Throat," by Dr. G. W. Grieve, D.D.S.

"Nose, Throat and Accessory Sinuses in Relation to Systemic Diseases," by Dr. D. J. Gibb Wishart, Toronto.

Thursday afternoon: Address in Surgery by Prof. Dean Lewis, Chicago.

"Treatment of Pneumonia," by Prof. Solomon Solis Cohen, Philadelphia.

Business Meeting.

In the evening Dr. Weston A. Price, D.D.S., D.S.C., M.E., Cleveland, will give an address on "Mouth Infections and Some of the Mechanisms by which they Produce Localized and Systemic Diseases."

Prof. John Wyeth, Prof. John A. Bodine, and Prof. C. H. Chetwood will illustrate some operations by moving pictures.

On Friday afternoon there will be a Military Section in which subjects of interest to the Army Medical Corps will be discussed.

On Friday evening Prof. Stephen Leacock will give an address.

## Industrial Medicine

---

### NITRO-DERIVATIVES AND TOXIC JAUNDICE

The handling of nitro-explosives has long been known to be a risk to the health of the operatives concerned unless careful regulations are obeyed, and a recent event would seem to imply that a stricter control of the provisions of the Factory Act is desirable now that the number of persons employed in such work has been so largely increased. That, at all events, was the view of a coroner's inquiry held this week by Mr. Luxmoore Drew into the circumstances of a female worker's death after employment in a munitions factory. It can be well understood that certain details as to the exact nature of the chemical explosive to which the illness and death of the operative were traced, according to the evidence given by the attending practitioner and official medical experts, cannot be disclosed. It suffices for the present to record that the illness was caused by the handling of a powder which contained a proportion of a nitro-hydrocarbon. The case in its medical details recalls the instances of poisoning by "dope," the varnish used in waterproofing aeroplanes, the toxic action being due in that case to the tetrachlorethane used as a solvent in the varnish which set up a fatal jaundice. Tetrachlorethane, however, is a more or less volatile fluid, whereas contact with a powder in the case just reported appears to have produced similar toxic effects. There would obviously be much less difficulty in the removal of a vapor from the neighborhood of the operative than the removal of scattered particles of a powder. The case was diagnosed by Dr. H. P. Potter, and post-mortem appearances were described by Dr. B. H. Spilsbury, and Dr. T. M. Legge, H.M. Inspector of Factories, and the conclusion was that heart failure had supervened owing to a general process of degeneracy having been set up in the liver, heart, and kidneys by contact with a nitro-derivative. It was a case of toxic jaundice, as it has occurred in poisoning by "dope," and the body showed the typical pigmentation. The jury expressed their appreciation of the clearness of the medical evidence, and returned a verdict of "Death from misadventure," adding a recommendation that there should be fewer persons engaged together in a unit of space and that the provisions of the Factory and Workshop Acts should be rigidly enforced in such workshops. It may be remembered that in the *London Gazette* of October 12th,

1915, the Home Secretary gave notice of an Order under Section 73 (4) of the Factory and Workshop Act, 1901, applying the provisions of the said section to all cases of toxic jaundice occurring in a factory or workshop; the Order would apply to jaundice due to tetrachlorethane, to nitro or amido-derivatives of benzene, or, indeed, to any other poisonous substance.—*The Lancet*.

### OCCUPATIONAL INJURIES DUE TO RADIUM

In the *Journal of the American Medical Association*, of Jan. 1st, Professor T. Ordway, of Albany Medical College, has described the effects observed during a year's radium work at the Huntington Hospital. Those who were applying radium in the treatment of patients noticed, after a few weeks, a slight though gradually increasing sensory disturbance in the finger-tips, particularly on the ulnar side of the first phalanx of the thumb and the radial side of the terminal phalanges of the index and middle fingers of each hand. These symptoms began insidiously and consisted of blunting of sensibility of the finger-tips, increased sensitiveness to heat and pressure, amounting at times to pain, and anesthesia of varying degrees. They were out of proportion to the objective changes, which consisted of flattening of the natural ridges on the affected fingers, with consequent changes in the finger prints, thickening of the horny layer of the epidermis with scaling, failure of the finger-tips to resume their normal shape after pressure, a sort of pitting and upgrowth of the cuticle at the base of and underneath the nails, which became extremely brittle and tended to stand off from the fingers. The assistants and nurses were warned of the dangers and told not to handle the emanation tubes with the fingers, but to use forceps. But some handling is unavoidable. For example, a medical practitioner began making routine applications of radium early in November, 1913. These increased in number until the latter part of January, 1914, after which they were few. After some weeks the tips of the thumbs, particularly towards the ulnar side, and of the fore and middle fingers, especially towards the radial side, gradually became numb and deficient in sensibility. There was greatly increased sensitiveness to heat, paresthesia in the form of a peculiar feeling in the finger-tips, and awkwardness in delicate manipulations. Small objects were frequently dropped and there was difficulty in taking pulses. The affected portion of the fingers became smooth and shiny and the ridges almost obliterated. Later the epidermis became thickened, dry, and parchment-like, and on

pressure with the finger-tips remained indented for some seconds. The thickened horny layer became wrinkled and cracked and desquamated. The nails stood off from the flesh of the fingers and there was a tendency to the upgrowth of tissue beneath the nail. At present, although the patient has handled radium for therapeutic application only occasionally for almost a year, the dryness, partial anesthesia, and slight tenderness of the finger-tips persist. Changes in the blood of radium workers have been described by Gudzent and Halberstaedter—relative and absolute increase of lymphocytes and relative and absolute decrease in neutrophiles. These were also observed by Professor Ordway. Various general symptoms, such as headache, malaise, weakness, unusual need of sleep, irritability and disorders of menstruation, have been described, but it is doubtful whether they are due to the radium or to other causes, such as close confinement and tiring routine. To prevent these effects Professor Ordway advises that in the application of radium there should be a rotation of the staff, and affected persons should at least temporarily abandon the work. Protection should be given as far as possible by screens in the form of boxes or plates about the radium. The operating rooms should be well ventilated, particularly if any radium emanation is present.

---

### OCCUPATIONAL DISEASES AND INDUSTRIAL HYGIENE

Occupational diseases are, of course, very prevalent. The pity, and in many instances, the shame of it is that such diseases may be prevented. Some occupations are notoriously unhygienic, and it is difficult to provide precautions which will rid them of their disease-conveying tendencies, but, on the other hand, much can be done, which is left undone, to better and render more hygienic the condition of toilers, even in the most menacing occupations. Often, perhaps most frequently, bad conditions in workshops and factories are allowed to exist and continue for economical reasons. Employers are only too often more intent on making money than careful of the health of their employees, and have to be compelled by law to safeguard the lives and bodily welfare of those who work for them. It also occasionally happens that laws when made are not enforced. In the recent report of the Surgeon General of the Public Health Service the question of occupational diseases and industrial hygiene is discussed at some length. During the year investigations of occupational diseases and the hygiene of workers have been carried on under the direction of Surgeon I. W. Schereschewsky. A comprehensive in-

vestigation begun in the fiscal year 1914 was concluded in 1915, and the results recorded in the report. The persons examined belonged to the cloak and suit, and dress and waist industries in New York City, which employ a total of 86,000 individuals. The incidence of defects and diseases was noted in the case of 3,086 workers, and there were recorded 13,457 defects and diseases of all kinds, of which 9,541 were in males and 3,916 in females. The examination showed no vocational diseases peculiar to the garment worker. Nevertheless, it was evident that the effect of sedentary occupations, such as women's garment industries, was to intensify the bad effects upon health and efficiency of certain defects and diseases or to produce them, in predisposed individuals. Tuberculosis is the most prevalent disease among garment workers, 3.11 per cent. of the males examined and 0.9 per cent. of the females being found to be tuberculous. Apart from tuberculosis, the most common defects and diseases among garment workers, in order of frequency for both sexes were: Defective vision, 69 per cent.; faulty posture, 50 per cent.; chronic nose and throat affections, 26.2 per cent.; defective teeth, 26 per cent.; pyorrhea, 26.2 per cent.; dysmenorrhea, 20.2 per cent.; hypertrophied tonsils, 15.3 per cent.; defective hearing, 10 per cent.; nervous affections, 7.75 per cent. The investigation resulted in the making of recommendations to the joint board of sanitary control for the improvement of conditions under the board's jurisdiction. Stress was laid upon education as a means of improving the knowledge of personal hygiene of the worker, the lack of which plays an important part in the causation of the defects and diseases noted in the examinations.

With respect to economic conditions and their relation to the public health, Surgeon Warren submitted a report in which he showed how intimately the problem of disease prevention is related to industrial and economic problems and the necessity for co-operation between public health workers and those endeavoring to solve our economic problems. Hygienic standards were defined and outlined according to responsibility. The most important of these were discussed in order to show the relation of insanitary conditions in places of employment, long hours of labor and fatigue, poor living conditions, cost of living, wages and income, and woman and child labor, to the health of the individual worker and the community. The relation was especially shown by the sick and death rates according to occupation and their effect upon the infant mortality. The relation of sickness to labor unrest was also pointed out.

As we have said, the question of the health of workers is of the utmost concern, not only to the workers themselves, but to the community at large. It is obviously false economy and bad policy to avoid taking precautions to guard the health of workers because it costs something. Viewed even from the purely selfish standpoint, it is not economical in the long run. The good health of the people is the greatest national asset, for if disease is engendered and its progress encouraged by the neglect of the laws of health, like a boomerang it will strike those responsible for the conditions and in time will undermine the health of most of the inhabitants. If disease flourishes man will decay and the nation of which he is a part will disintegrate and come to naught. Therefore laws should be made and strictly carried into effect which are best calculated to conserve the health of the workers. The Public Health Service is doing good work in this direction, and its efforts should be forwarded by the authorities that be.—*Med. Rec.*

---

### THE TOXICITY OF ARSENOUS AND ARSENIC ACIDS

Compounds of arsenic are becoming so prominent in therapy, and the types of arsenic products for use in medicine have become so diverse, that any information bearing on their possible mode of action should be welcome. The familiar derivative of arsenic which early found its way into use both as a drug and as a poison is the white arsenous oxide often itself spoken of simply as arsenic. The salts of arsenous acid are also employed, as in Fowler's solution. Arsenic action is not due to the element, but to the ion of arsenous acid,  $H_3AsO_3$ . Organic arsenic compounds in which the metallic atom is attached directly to carbon are only feebly toxic. In the course of time, within the body they seem to yield more or less arsenous acid, a reaction which may suffice to explain any pharmacologic potency possessed by the organic derivatives. It is a somewhat unexpected fact that the closely related arsenic acid  $H_3AsO_4$ , its anhydride and its salts are far less poisonous than is arsenous acid. This statement has now and then been disputed, but only recently again substantiated at the pharmacologic institute of the University of Berlin by Joachimoglu. The relatively greater toxicity of arsenous in comparison with arsenic acid could be demonstrated by the proportion of 10:6 in the case of the lethal dose required for intravenous injection in animals. Perfusion experiments with isolated frogs' hearts indicated the arsenous compounds to be 300 times as harmful as those of arsenic acid. In



the case of the isolated intestine the contrast, though plain, was not equally striking. This has raised the question why there should be a marked disproportion in the relative toxicity of comparable quantities of arsenic and arsenous acids, depending on the mode in which the test is made. The explanation proposed is as follows: The toxicity of the arsenic acid depends on the reducing power of the tissues with which it comes into contact. By this means it is converted into the very poisonous arsenous compound. Some individual organs or tissues have comparatively slight reducing potency. In the isolated heart, for example, arsenic acid exhibits little toxicity. Throughout the living organism as a whole the reduction of arsenic acid appears to be far more readily accomplished; hence, after intravenous administration of the ordinarily less noxious derivative, it may become more toxic so promptly by conversion to arsenous acid that the real difference between these related arsenic derivatives is no longer conspicuous. This may also explain some of the uncertainty or confusion which has existed in the past in respect to the comparative action of the two substances.—*J.A.M.A.*

---

### REPORTED DANGER FROM ENAMELWARE

Among the thousand and one causes given for appendicitis, enamel chips from cooking utensils have been included. We are informed that the Superior Council of Hygiene for France recently recommended that legislation be enacted forbidding the use of enamelware meat choppers in the production of Hamburger steak. It was observed that the enamel on such machines was in many instances almost entirely worn off, and the assumption was made that the small particles of enamel which had become broken off were quite likely to be mixed with the meat. To avoid all possible danger from the consumption of such particles, this action was taken. Langworthy and Lang, of the Office of Home Economics in the U.S. Department of Agriculture, state that there appears to be no case on record in which it is known that any serious injury has been done to the intestinal wall by enamel particles. They call attention, however, to another feature of the now widely used enamelware articles which is somewhat more likely to be a source of hygienic danger. In coloring the enamels, pigments are sometimes added in the form of one of the metallic oxides. Insoluble materials are also incorporated into the "glass," of which the enamel is essentially

composed, in order to render it opaque instead of transparent. For this lead oxide has been used to some extent, particularly because it helps to produce an easily fusible product. Lead enamels, like lead glasses in general, offer a poor resistance to chemicals, and are quite readily attacked even by substances which have no action whatever on ordinary glasses which contain no lead. The government experts now venture the statement that the use of lead compounds for these purposes, and of lead oxide for producing an opaque appearance, fortunately is fast being discontinued in the manufacture of enamelware and cooking utensils on account of the possible danger of lead poisoning, since the lead in this form is easily dissolved by dilute acids, like vinegar and the acids of fruit juices. With regard to possible dangers from the use of antimony salts to impart desired tints to some kinds of enamel, it is said that preliminary experiments, made in the Department of Home Economics of the University of Illinois, apparently showed that small amounts of antimony compounds were extracted when dilute solutions of organic acids were cooked in some of the cheaper grades of enamelware. It is now possible, however, to secure enamelware utensils which, according to the manufacturers' labels, are free from antimony compounds.—*J.A.M.A.*

### THE SIZE OF THE NEW ARMY

*To the Editor of The Lancet.*

SIR,—When we read in the newspapers that the British army is now 4,000,000 men, and remember that before the war it was about 805,000, we are a little at a loss for appreciating the comparison. The following method may help us to realize what this increase means. There are 810,697 words in the Bible, and we had about that number of soldiers. There are also 3,566,480 letters in the Bible, and we can now consider every letter as a soldier instead of every word as heretofore. Also, we may consider that the first letter of every three verses is a medical man in the R.A.M.C., for there are about 10,000 medical officers now (vide "Strength of the Royal Army Medical Corps," *The Lancet*, November 20th, 1915, p. 1167), and there are 31,173 verses in the Bible. To take a Bible and turn over its leaves and realize that every single letter is a soldier in our army produces an impressive feeling of what fighting means.

I am, Sir, yours faithfully,

February 14th, 1916.

ACCOUNTANT.