ABSTRACTS

THIS SECTION OF THE JOURNAL IS PUBLISHED IN COLLABORATION WITH THE TWO ABSTRACTING JOURNALS, ABSTRACTS OF WORLD MEDICINE, AND ABSTRACTS OF WORLD SURGERY, OBSTETRICS, AND GYNAECOLOGY, PUBLISHED BY THE BRITISH MEDICAL ASSOCIATION. THE ABSTRACTS ARE DIVIDED INTO THE FOLLOWING SECTIONS: TOXICOLOGY; INDUSTRIAL PHYSIOLOGY; INDUSTRIAL LUNG DISEASE; INDUSTRIAL DERMATITIS; ACCIDENTS AND ORTHOPEDIC SURGERY; ENVIRONMENT; GENERAL.

TOXICOLOGY


Lead tetraethyl petrol was introduced in New York City in 1924, and, as the product was causing fatal effects in some of the men working with it, it was thought advisable to collect dirt from various streets as a basis for comparison before an appreciable amount of the petrol was in use. The dirt was collected from 4 localities, and was again collected from 5 localities (of them the same as before) 10 years later, that is, at a time when the ethyl petrol was extensively used. Samples of the dust weighing 5 g. were ashed in small silica dishes; the lead was extracted with a small volume of hot dilute nitric acid, and quantitatively determined by the standard dithizone procedure. Any bismuth that might be present was previously extracted with dithizone while the solution was still acid. The mean quantity of lead found in 1924 was 0.119 g. per 100 g. of dirt, and in 1934 0.176 g., an increase of almost 50%.

H. M. Vernon.


In four years 12,000 samples of urine and 100 of blood have been analysed for lead and 800 air samples for lead and zinc by means of the polarograph. The analyses were carried out at the American Brake Shoe Company, Chicago, in order to control the risk of lead poisoning encountered in brass foundry operations. The polarograph has a dropping mercury electrode, the surface of which is constantly renewed in order to measure the current voltage of a reducible solution. The voltage is increased at a constant rate, and the current passing through the test solution is measured by a galvanometer whose action is recorded by a beam of light on photosensitive paper. When the reduction potential of a given ion is reached a greater current flows, in an amount proportional to the concentration of the ion, and from the "step-up height" of the recorded curve the concentration can be deduced. A calibration curve has been prepared by electrolysing eight solutions of known lead concentration, but many interfering factors have to be controlled—for example, all vibration of the galvanometer must be avoided, the mercury used must be chemically pure, the pH of the test solution should be kept between 5 and 7, and dissolved oxygen must be removed from the solution by bubbling hydrogen or nitrogen through it. Analyses of urine samples made by the more accurate but more laborious dithizone method gave results of the same order of magnitude as those obtained by the polarograph method, but results obtained by the two methods with the same urine samples are not recorded.

The author also describes his application of the polarograph method to the simultaneous analysis of the lead and zinc in the air collected in brass foundries. The sample collected is washed from the electrostatic precipitator tube with 5% nitric acid, and after further treatment of the dissolved sample polarograms are recorded at two voltages. They give different step-up waves for the lead and the zinc. Data are recorded showing the accuracy of the method for estimating lead, but none is given for the estimation of the zinc. H. M. Vernon.


This paper describes what appears to be an accurate polarographic method for determining simultaneously the relatively small quantities of lead (3 μg. per ml.) in the presence of large amounts of zinc (300 μg. per ml.), such as occur in foundry atmosphere. The author has adopted a "double internal standard," which employs cadmium-manganese ions in such proportion that the concentration of the cadmium internal ion is of the same magnitude as that of the lead to be determined, while the manganese internal ion lies within the range of the zinc concentration. Only one solution of the test sample is needed, and the Pb/Cd combination is polarized at or near the full sensitivity of the instrument in the presence of gelatin as a maximum suppressor, 0.1 N acid chloride ion base being used. The Zn/Mn combination is polarized at a tenth of the sensitivity used for the lead determination, but in an alkaline 0.1 N chloride ion base. Simple ratios are obtained by dividing the height...
of the lead-wave-step by the height of the cadmium internal wave-step, according to the method devised by Cholak and Bambach, and interpreting the ratios by means of prepared standard curves. In the same way the height of the zinc wave-step is divided by the height of the manganese internal wave-step.

The method here summarized is described fully by the author with many details of experiment. Figures showing typical polarograms are given, with numerical interpretations of the observed galvanometer deflections. Also there is a table of the galvanometer deflections observed with various lead-zinc polarographic standards, containing different ratios of Pb/Cd and of Zn/Mn. The data recorded indicate that the range of the zinc concentration could readily be extended to 600 μg. per ml. if the concentration of the internal manganese ion were increased.

This paper was submitted for publication a few weeks after the paper by Weber which appears in the same issue (see above abstract.)

H. M. Vernon.


The standard for lead in drinking water and all beverages is 0·1 parts per million. The only standard for foods is the U.S. Government figure for lead in spray residues on fruit, 7·1 p.p.m. This is not severe enough for all foods. Daily ingestion of about 0·5 mg. of lead in food or drink, with intermittent ingestion of somewhat more is safe; but daily ingestion of more than 0·5 mg. is apt to cause intoxication. Permissible lead dust in U.S. industry is 1·5 mg. per 10 c. metres; the British figure suggested by Legge and Duckering was 5 mg. Ten cubic metres is chosen as the volume of air supposedly breathed in an 8-hour working day. The author suggests that the figures mentioned should be reviewed; it has been applied indiscriminately, and allows for no distinction between the different chemical forms of lead and lead compounds and their known differences in toxicity.

D. Stewart.


There is a strong tendency to blame lead for almost any condition that cannot be explained by some other cause. Where suspicions arise it is the policy of the Lead Industries Association to recommend an impartial scientific investigation, full publicity being given to the conclusions. Examples of such inquiries are given.

D. Stewart.


Lead interferes with synthesis of protoporphyrin and alters the reticular substance of erythrocytes, but there are no specific blood changes in lead absorption. Basophil stippling becomes significant in relation to lead absorption: (a) when a uniform method of study is employed for which normal ranges of values have been defined; (b) when investigations are repeated frequently on groups and used as an index of trends in exposure; (c) as supporting evidence in the diagnosis of lead intoxication; and (d) to exclude lead intoxication. Other blood changes are more variable and less characteristic than is the stippling.

D. Stewart.


Samples of air breathed in by groups of the population of Cincinnati (not factory workers) showed that an individual inhaled about 0·1 mg. of lead per day. In experiments over 6 to 8 months the normal healthy adult was found to excrete a little more lead than he ingested in his food and drink. Experiments also showed that about 10% of lead given in solution is absorbed. This is greater than would be anticipated under ordinary circumstances. Other work indicates that under normal conditions or in incidental lead exposure outside the lead industries the metal does not accumulate in the body. The safe level for the ingestion of lead in food and drink is greater than 0·3 mg. and less than 0·6 mg. per day.

The normal person has a blood lead concentration between 0·01 and 0·05 mg. per 100 g. whole blood. From 95 to 98% of this is found in the erythrocytes, so a strong first line of defence is created against intoxication. Increasing exposure to lead in industry is associated with increased lead concentration in blood. Lead excretion in the urine compatible with complete freedom from the risk of lead poisoning varies from 0·04 to 0·08 mg. The amount can rise to 0·12 mg. without evidence of intoxication. When, in an occupational group, excretion exceeds 0·12 mg. evidence of intoxication is found before long.

D. Stewart.


In a previous communication the authors described the disappearance of cells with granular basophilia from the blood of 537 workers who continued to be exposed to lead. Experiments are described in which guinea-pigs were given a 2% solution of lead acetate by the mouth. The authors note that basophil punctuation, which increases and decreases at irregular periods during progressive poisoning with lead, finally diminishes or disappears. This disappearance does not signify improvement, for with all their animals it preceded death. They suggest that an acidophil substance, which is the material taken on a granular appearance, is used up as the degree of intoxication increases. Their histological sections also suggested that, though magnesium did not affect the appearance of the red cells, it was apparently able to afford some protection to the hepatic and renal cells of the animals which received it.

G. C. Pether.


Inhalation of cadmium fumes or dust gives rise to a characteristic pulmonary syndrome, whereas ingestion of cadmium causes mainly gastro-intestinal symptoms. Of the former, 64 cases have been recorded since 1858; 10 died. The man may continue to work in the fume for several hours. Within 8 hours he complains of irritation of the throat, headache, cough, and chills; 24 to 36 hours later symptoms of pulmonary oedema develop, with shortness of breath, pain in the chest, persistent cough, weakness, and widespread, patchy bronchopneumonia or areas of pneumonitis. There is no evidence of permanent fibrosis of the lung. A case is described.

K. M. A. Perry.

In a factory for the production of butanol from croton alcohol, several workmen suffering from fever and various other signs of poisoning after cleaning out an oven in which there was much dust consisting of minute particles of copper and certain of its compounds (cuprous and cupric oxide). This process of cleaning was preceded by blowing steam through the oven to rid it of certain gases. The cleaning itself usually took between 2 and 8 hours, occasionally up to 24 hours. The workmen complained that soon after starting this task they experienced a sweet taste in the mouth, smarting of the eyes, irritation of the throat, a dry cough, and a sense of oppression. After a latent period of about a day the leucocytes rose to 10,000 to 15,000 per c.mm., returning to normal after a few days. Diarrhea, noted in about 30% of the cases, developed as a rule only on the second day. Examination of some 50 workers failed to reveal evidence of permanent sequels to this poisoning. Examination of the suspended particles in the air of the oven showed that their size ranged from 1 to 15μ. An account is given of the prophylactic measures undertaken, special attention being paid to the use of masks, which the workers found satisfactory.

C. A. Clark.


Two series of lead and zinc fume samples were taken in four brass foundries employing from 3 to 741 men. Concentrations of lead exceeding the generally accepted standard of 1.0 mg. per 10 cubic metres were observed only in one foundry. High zinc concentrations were likewise found only in one foundry. In a second series of samples there were no lead or zinc concentrations approaching the threshold. An unpublished report by the Wisconsin State Board of Health showed that one out of four of the Kentucky foundries, and five or six of the Wisconsin foundries, had high lead concentrations for melting and pouring.

To test the extent of the lead absorption, spot urine samples were collected from 94 men who had been exposed in five foundries for periods of 7 to 17 years. On an average 34% showed an excess of urinary lead above the usually accepted maximum safe limit of 0.15 mg. per litre. Blood samples were taken from 24 foundrymen, and 79% had a lead absorption above the recognized limit of 0.07 mg. per 100 g. blood. Stippling (of 1,000 or more cells per million) was observed in 11% of the 98 samples tested. The amount of lead absorbed by the exposed workmen in different foundries corresponded well with the percentage of lead used in the brass alloys, but the results of personal air sampling seem to offer final criteria of the safety or degree of hazard associated with the process. It is better to use both the methods when evaluation of the severity of a lead fume exposure is being attempted. The value of the stippled-cell test as the only laboratory aid in the diagnosis of lead poisoning for the stippling is not pathognomic of plumism. The clinical record of symptoms and physical signs shown by over half the foundrymen indicated a mild alimentary type of lead intoxication.

The fume problem in brass foundries requires a specialized engineering investigation in ventilating and production, and a hygienic control involving the co-operation of management, workers, and industrial hygienists. Natural and even forced general ventilation is inadequate, and the fumes should be controlled by suitable enclosure-type hoods and local exhaust ventilation.

A fine series of photographs is appended.

H. M. Vernon.


The development of atomic energy has produced risks of injury infinitely greater than those already experienced in minor degree in the radium industry, in x-ray work, and more recently in research laboratories working with equipment such as cyclotrons and betatrons. Some of the elements used, such as beryllium and cadmium, are extremely toxic as well. Protection against these risks must be provided for personnel at the site and for the community surrounding it. Dry waste is generally disposed of by deep burial underground. Liquid waste in small quantities may be disposed of also by burial, but large quantities must be diluted sufficiently to allow discharge into near-by streams, a concentration which will not be harmful. Safeguards to be effective must cover both personnel and equipment, and present a big problem. All workers must understand the dangers. The actual supervision, however, is best accomplished by a special "health-physics" team; this, to cover all phases of a works research and production organization employing 1,500 persons, might require a team of up to 70 individuals.

Personnel can be controlled by the use of pocket, badge, and special meters used to detect the amount of radiation received. They are termed personnel-monitoring meters. Instruments used to determine amounts of radiation in work areas are referred to as survey instruments. Some are mobile and are used to detect radiation from sources or contamination of various sites and objects such as floors, walls, and desks. Others, such as integrators and monitors, are stationary and may be called area-monitoring instruments; they are used to measure and record general background radiation levels. They may be connected to an alarm system to sound a warning when a given radiation level has been reached. Barriers are always necessary, and in large installations like piles may be massive concrete walls 3 to 8 feet thick.

Distance is the best barrier, but it is often necessary to use concrete and lead for walls, doors, movable blocks, and bricks to protect against beta and gamma rays, and to use water or paraffin to stop neutrons. Ropes and danger notices may be used in danger areas. Ventilation is important on account of heat and to prevent air-borne contaminants becoming lethal. Protective clothing is valuable, but facilities for laundering contaminated clothing must be provided. Cerium, cadmium, and modified washing cycles are required to remove such substances as plutonium. Despite all these safeguards some persons will be exposed to dangerous amounts of direct radiation or acquire damaging quantities of radioactive elements in their systems. Routine tests of the workers' blood, sputum, expired air, urine, and stools for alpha, beta, and gamma emitters as well as for chemically toxic substances should be carried out. It
these are found, the worker should be prevented from further absorption. A person exposed to neutrons may have induced radioactive elements in his body, when active sodium and potassium are readily detectable in the urine. Methods for correctly determining infinitesimal amounts of alpha emitters are laborious but are important to the well-being of the workers, since plutonium has an extremely long half-life and a toxicity approaching that of radium.

K. M. A. Perry.


Radiations of practical consequence include α, β, γ, x rays, and neutrons. The α rays, high-speed (12,000 to 18,000 miles or 19,300 to 29,000 kilometres per second) helium nuclei with a weight over 7,000 times that of an electron, are unable to penetrate more than a few centimetres of air, and can be stopped by a thin sheet of paper, so that protection of workers from these rays is simple. The β rays, high-speed electrons with a velocity equal to 30 to 90% that of light, have much greater penetrating power than α particles, but can be stopped by a sheet of aluminium 2 mm. thick. High-voltage x rays and the γ rays emanating from radium and other radioactive elements have such a great penetrating power than a centimetre or more of a heavy metal such as lead, or several feet of concrete, may be required to stop them.

Biological effects of radiations are believed to be due to their capacity to ionize the matter through which they pass. The α particle produces a dense ionization along a short path, in contrast to the β particle which produces a sparser ionization along a longer course. Neutrons, like x rays and γ rays, produce ionization indirectly. The resulting ions induce chemical changes which alter the reactivity of the cell. It must be emphasized that radiation has never been shown to cause any biological change that cannot be brought about by other means.

A major effect of radiation is to accelerate the production of mutations, for the chemical changes induced in the cell by ionization may permanently change a few of the chromosomes and lead to mutation. Most of such mutations are fatal, but when they are not the cells produced from them have permanently different characteristics. Immature cells and cells in an active state of division are more sensitive to radiation than cells which have already acquired their adult morphological and physiological character. Thus haematopoietic tissue, whose mitotic rate is high, and reproductive tissue, whose product is immature, are very sensitive to radiation. Studies on the chronic effects of radium showed that a residuum of from 0.5 γ to 2.0 γ of radium in the body sometimes proved fatal, often because of osteogenic sarcoma. A residuum of from 0.02 γ to 0.5 γ could apparently be tolerated, but the now accepted tolerance limit is 0.1 γ. The metabolism of radium is similar to that of calcium, and almost all of the residual radium in chronic cases is found in the skeleton. This accounts for the unusual incidence of terminal skeletal neoplasms.

H. M. Vernon.


Radioactive sources have been devised which, by ionizing the air, prevent the accumulation of static electricity at critical places in industrial machinery, such as the contact between conveyor belts and their rollers.

In textile and paper mills radioactive static-eliminators appear to be important safety appliances, because they reduce the risk of fire or explosion of chemical vapours by eliminating the possibility of electric sparks due to static electricity. Unfortunately the radioactive sources cause a new risk, because of the penetrating beta and gamma rays which they emit. To ascertain these risks elaborate physical methods have been employed by the author, and for a detailed description of them and of the relevant mathematics the original paper must be consulted.

It is considered that the daily dose of gamma-radiation, when the entire body is exposed continuously to a field of uniform radiation, should not exceed 100 mr per day. This means that no gamma-ray effects should be expected if all parts of a worker's body are further than 9 inches from any part of a static-eliminator having a radium concentration of 25 μg. of radium per inch. The maximum permissible gamma-radiation is applicable only if the beta-radiation has been eliminated by appropriate absorbers, such as shields of 1⁄4-in. lead, 1⁄4-in. iron, or 1⁄4-in. wood. The maximum permissible dosage for beta-radiation is considered to be 125 mr per hour, at distances of 18 to 33 in. from unshielded sources of various lengths, each containing 25 μg. of radium per inch. At a distances of a few feet from the active surface the ionization due to beta rays is about 100 times that due to gamma rays, but the rays have little penetrating power, and 0.3 cm. below the skin surface the radiation is reduced to a tenth of its dosage rate.

H. M. Vernon.


These three articles report the effects of pyridoxine hydrochloride on radiation sickness in groups of 81, 50, and 20 cases respectively. Favourable results were obtained, more especially when the drug was given in doses of 25 to 50 mg. intravenously. Most of the failures occurred in those cases in which the upper abdomen was irradiated. The only undesirable toxic effect reported was a skin eruption in one case; it disappeared when the drug was withdrawn and reappeared when administration was resumed.

G. Boden.


"Trasentine," an intestinal anti-spasmodic, was used alone and combined with phenobarbital in a series of 65 cases undergoing irradiation therapy. It was given by mouth; there were no undesirable toxic effects. Relief from diarrhea and attendant symptoms is claimed for a majority of the patients, but there is no record of the level of radiation dosage.

G. Boden.
ABSTRACTS


An analysis was made of 52 workers employed in applying luminous paint to dials. All the workers were women, 18 to 63 years of age, and they had been employed for 18 to 50 months, or an average of 25 months. At intervals of 6 months breath samples were analysed for radon content, the tolerance established by Evans of 100–11 curies per litre of radon (equivalent to 0·1 μg of radium) being accepted as the maximum permissible. In Britain employees in contact with radioactive luminous paint must not work continuously for more than a year, but may return to the occupation after a three-month rest. No such regulation was in force for the women under discussion, but they were absent from their work for a total period of 6 to 10 weeks from all causes. Their health was not very good, for of the 52 workers 12 showed unsatisfactory dental hygiene, 27 a reduction of 10% or more in red blood cells or haemoglobin, 31 an unsatisfactory standard of nutrition, and in 10 the breath-radon analyses sometimes showed an excess above the tolerance limit mentioned. Practically all instances of excess above tolerance seemed to be due to the recommended precautions not being seriously carried out; for example, the women did not scrupulously wash their hands, or they admitted eating food in the workroom. However, after being warned they became more careful and their breath-radon fell well below tolerance level.

H. M. Vernon.

Arsenical Keratitis Due to Industrial Poisoning. (Kératite arsenicale par intoxication professionelle.) PAUQUIE and BONAMOUR (1946). Arch. Mal. prof., 7, 199.

Though other symptoms of arsenic poisoning are well known, the conjunctival and corneal manifestations are not. The authors report 2 severe cases of arsenical kerato-conjunctivitis that occurred in a man working in a vineyard, who had handled arsenate of lime on many occasions. He had a generalized dermatitis which affected especially his limbs, and also the lingual and buccal mucous membranes. Arsenic was found in the skin, nails, and hair. At first his right eye was generally reddened, and later the left eye became infected and watered freely with much photophobia. Later on the right eye cleared up, but when seen in hospital the left eye was much inflamed, the bulbar conjunctiva uniformly reddened, and a large ulcer was noted on the cornea. There was complete corneal anesthesia on this side. Blepharorrhaphy was performed, but weeping remained copious, and the patient had a temporal neuralgia. The authors think that the lesions had their origin in a poisoning of nerve fibres, which would explain the corneal anesthesia, and that a similar nervous mechanism may account for many lesions of the skin.

G. C. Pethy.


The arsenic content of tissues of mice exposed to arsine was determined. The percentage absorbed was approximately the same (64%) over the range of concentration employed (2·5 to 0·025 mg. arsine per litre). The lethal dose required to produce 50% mortality increased with decreasing concentration, suggesting that arsine is rapidly detoxicated by the body. Both in mice, where the amount absorbed was directly determined, and in rabbits, where it was estimated, it was found to vary with the concentration and duration of exposure. Considerable quantities of arsenic were found in certain tissues after these had been freed from blood by washing in saline or by perfusion and before hemolysis had started. This suggests that a certain proportion of arsine was circulating in the blood stream in solution and was thence directly absorbed by certain tissues.

At concentrations of 0·5 mg. of arsine per litre, the duration of exposure required to produce 50% mortality was doubled in mice which had received an intraperitoneal injection of 17 mg. of ethane-1, 2-dithiol, per kilo of body weight. The median lethal dose of this substance was found to be 55 mg. per kilo of body weight. Considerable reduction of mortality in mice was found when the dithiol was injected as long as 6 to 9 hours after exposure. At 12 hours the mortality was not influenced.

R. H. D. Short.


The effects on the water balance of the body when lewisite is applied to the skin of animals were investigated. After application to the skin, lewisite is absorbed into the body and circulates in the blood stream as lewisite oxide. Observations on the composition and flow of lymph following cannulation of the lymph duct to the limb show that the capillaries at the site of application are rendered freely permeable to the plasma proteins, with consequent neutralization of the osmotic effect of the circulation. After application of lewisite to dogs, the capillaries of the lung often become freely permeable to plasma protein. The resulting pulmonary oedema is associated with increased lymph flow from the right lymph duct. Elsewhere in the body the lymph flow does not indicate an increased capillary permeability.

The effect of this fluid loss is to cause a fall in plasma volume. The resulting picture of hemoconcentration, hypoproteinemia, fall in rectal temperature, and, in several cases, fall in blood pressure is similar to that seen in shock following thermal burns. With a substantial fall in blood pressure, urine secretion ceases. In less severe cases, oliguria with increased daily output of urea and increased plasma urea is part of the syndrome associated with anhydremia. This probably results from increased endogenous nitrogen metabolism with breakdown of muscle and liberation of water. Following the period of hemoconcentration, the period of anemia may be associated with a considerable fall in the amount of circulating haemoglobin. It is maximal at 7 to 10 days after skin application, and is probably the result of red-cell destruction caused by anhydremia. It is followed by a reticulocyte response and recovery in about 2 weeks. Its course is unaffected by the administration of iron.

R. H. D. Short.


Tetratinmethane is a toxic, irritating impurity formed in the nitration of toluene. It is a colourless oily liquid, boiling at 125.7°C and solidifying at 13°C; it is volatile, has a pungent odour like that of nitrous fumes and a high surface tension which increases its toxicity, and is a powerful explosive. Exposure to fumes of crude TNT leads to irritation of mucous, cough, dyspnoea, and dizziness in proportion to the strength of the odour of tetratinmethane. This substance may be present in amounts up to 0·12% in crude TNT, but is destroyed during the process of purification with sodium.
sulphite. The introduction of the sulphite process in the 1914-8 war in the U.S.A., Britain, and France reduced the incidence of illness in arsenals. Three recorded cases of intoxication in human subjects, with respiratory symptoms requiring the use of oxygen, are reviewed; 2 were fatal. Earlier experiments with tetranitromethane on animals showed mucosal irritation and pulmonary oedema without any latent period. In mild cases methemoglobin was formed. Crude TNT manufacture is still potentially harmful when nitration cycles are curtailed and re-charging of apparatus is speeded up; mild intoxication has followed upon changes in the sulphite purification process.

The authors exposed cats to fumes of TNT in three stages of purification and to fumes of waste products. Air was passed at 5 to 6 litres per minute over 800 g. of material on a tray in an exposure chamber. Air samples were trapped in alcohol. A colorimetric method for estimating the tetranitromethane is described. At room temperature the fumes evolved from crude TNT were enough to be fatal to the cats. With concentrations of 3:3 to 25:2 parts per million (p.p.m.) of tetranitromethane there was marked irritation of the mucous of the eyes, mouth, and upper respiratory tract, and acute pulmonary oedema. The lungs being full of sero-fibrous exudate and cellular infiltration. There was also methemoglobinemia, and fatty degeneration of liver and kidneys. When exposed to waste products from the neutralization of crude TNT by water the animals suffered mild irritation only, and the tetranitromethane concentration was 0:1 to 0:4 p.p.m. Residues from the sulphite process were not toxic. This work differs from that of a previous author who could not produce toxic fumes from crude TNT unless it was heated. It is suggested that 5 p.p.m. of tetranitromethane might be a safe concentration for workers.

J. N. Agate.


Attention is called to the frequency with which vague indigestion followed within a few weeks of increased exposure to benzol fumes in a rubber factory. The symptoms were a sensation of epigastric uneasiness with a feeling of distension, intolerance of alcohol, ready flushing, and often persistent frontal or temporal headache. Patients rapidly recover when withdrawn from exposure; in most cases there is no relapse when they return to work. Blood counts and gastroscopical appearances are tabulated. Gastroscopy showed little beyond slight inflammation in some cases. Either endoscopy is not sufficiently sensitive to detect slight changes, or the functional disturbance precedes the mucosal.

Denys Jennings


Poisoning by the nitro and amido derivatives of benzene may be encountered in industrial medicine and in clinical medicine after the use of acetonilide and dinitrophenol. Cases of poisoning by these compounds exhibit in the acute and subacute stages the clinical signs of cyanosis, but the duration and the sequela may be different for each compound.

The author observed several cases of poisoning by m-dinitrobenzene during the manufacture of munitions and the production of dyestuffs. The case-histories of 4 patients are recorded. Acute poisoning by dinitrobenzene starts with headache, a feeling of pressure in the chest, nausea, and vomiting. Cyanosis soon develops and, in severe cases, liver tissue may be destroyed and acute yellow atrophy follow. When the acute phase subsides, the patient may be seriously ill under the influence of small amounts of alcohol. This was shown from the histories and by experiment 6 weeks after the disappearance of symptoms of acute poisoning. Exposure to sunlight also produces a dramatic return of symptoms of acute poisoning.

In 8 cases the serum was investigated by Heyrovsky's polarograph for nitro compounds in the blood. These were found only after the consumption of beer, and this is considered by the authors to be a useful test for dinitrobenzene poisoning. Webster's reaction in urine, which is specific for TNT poisoning, was always negative. There is also evidence of increasing sensitivity to the poison. First exposure may give rise to cyanosis after 1 week, a second after 4 days, and a third exposure a grave condition set in on the first day.

R. S. F. Schilling.


The effect of benzene vapour on employees of two roto gravure works was studied. The estersulphate, muconic acid, urochrome A, polyphenol, and ascorbic-acid contents of urine samples from 53 employees who had been exposed to benzene vapour for periods ranging from 1 to 30 years, and who had previously been examined clinically, were compared with samples from 49 employees of the same works who had not been exposed.

The atmospheric concentration of benzene in the first works varied from 0.8 to 1.5 mg. per litre of air, and that in the second from 0.29 to 0.64 mg. per litre. The mean ester-sulphate concentrations (expressed as a percentage of the total sulphate in the urine) for the exposed employees from the two factories and for those in the control group were 27-2%, (29-8 to 39-9), 17-4%, (4-5 to 50-7), and 7-5% (0-7 to 15-4) respectively, and were not seriously affected by the oral administration of vitamin C tablets. The values were generally related to the degree of exposure to benzene vapour, but the individual variations were large.

The concentration of muconic acid in the urine of exposed subjects did not exceed 3 mg. per litre. Larger quantities of urochrome A and polyphenols were found in the urine of exposed employees than in that of the control group, and the increase was to some extent dependent on the supply of vitamin C. There was no significant difference between the ascorbic-acid concentrations in the urines of the exposed and of the control employees. The former were more difficult to saturate with vitamin C by oral dosage than

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the latter. Only 35% of the exposed employees from the first works and 48% of those from the second showed normal saturation (7 mg. of ascorbic acid per 100 ml. of urine after dosing with 300 mg. of ascorbic acid daily for 10 days), as against 80% of the control group. It is suggested that exposure to benzene vapour increases the need for vitamin C and that the vitamin protects against the toxic effects of benzene.

Technical and medical prophylactic measures to reduce the industrial hazard of benzene are described.

J. E. Page.


Fourteen women and three men engaged in making fluorescent lamps contracted respiratory disease; the clinical findings are summarized. These cases differ from any previously reported in their delayed onset and in progression of the disease in spite of a change of environment. Some developed the condition while still at work, after long exposure; others from three months to three years after discontinuing contact. Severe loss of weight and progressive dyspnea on exertion were the first symptoms. Cough was variable and at first non-productive, gastro-intestinal symptoms sometimes predominated, and anorexia was common. In the acute phases there was cachexia, dyspnea, cyanosis, and sometimes enlargement of liver and spleen. There was stipping of the lungs, mostly midzonal, sometimes generalized. Acute respiratory infections caused exacerbation of symptoms. One patient recovered completely, but 6 have died after an illness of 2 years, and of these deaths 2 were from heart failure. Some of the remainder are improving and some remain seriously disabled. Nephro-thiathiasis occurred twice. Laboratory tests were negative. A differential diagnosis must be made from miliary tuberculosis, Boeck's sarcoiud, and silicosis. Treatment by chemotherapy was ineffective. Exposure to beryllium compounds was certain in all these cases; nevertheless the delayed chemical pneumonitis described here must be distinguished from the acute disease previously reported to occur after short exposure to these compounds.

J. N. Agate.


Three cases of tellurium exposure treated with BAL in oil are recorded. The men received injections of 2.5 mg. per kilo body weight intramuscularly into the buttock every 4 hours for 24 hours and every 6 hours for a second 24 hours, then one injection daily for 6 days. The results suggest that tellurium may be added to the list of metals, poisoning with which has been successfully treated with BAL.

K. M. A. Perry.


A series of recent investigations on haemodynamics in phosgene poisoning is described.

It is stated that the evidence for interference with the pulmonary circulation in phosgene poisoning is equivocal. There is disturbance of the pulmonary circulation after gassing, but whether or not this is sufficient to interfere with respiration or with the circulation is debatable.

Cardiac dilatation and venous engorgement were observed but were not constant findings, whereas venous pressures were rarely found to show any appreciable increase. Conclusive evidence of the absence of any back pressure on the right heart was obtained. These findings argue against the use of venesection as a therapeutic measure. Shock therapy, infusion of whole blood or plasma, and the giving of desoxycorticosterone or vitamins have been found to have little influence on the mortality rate. Heparin given to prevent thrombin formation, and quinine or mepacrine given to prevent clumping, have proved therapeutically useless, as has histamine. The observation is made that death is due primarily to an interference with oxygen uptake through edematous lungs. If the acute stage of pulmonary oedema is survived, the state of the circulation may become a more important factor in the prognosis.

Richard D. Tonkin.


This investigation is the continuation of a previous study of the sensory response limit for concentrations of various solvents, made in order to estimate the ventilation requirements necessary for comfortable working conditions. Eighteen solvents were investigated, 11 of them not previously studied. Twelve subjects of both sexes were tested with each solvent, the time of exposure being 15 minutes. Of the ketones tried, methyl isobutyl ketone gave, in the majority of subjects, a sensory response limit of 100 parts per million (p.p.m.) for 8-hour exposures. With diacetone alcohol the reliable limit appeared to be 50 p.p.m.; with isophorone the satisfactory limit was as low as 10 p.p.m. Of the alcohols tested, less than 5 p.p.m. of diisobutyl carbinol caused irritation of the eye in the majority of subjects, and 10 p.p.m. caused irritation of the nose and throat as well. Of the esters tested, both methyl amyl acetate and isopropyl acetate gave a sensory limit of 100 p.p.m. for 8-hour exposures; and with ethers, n-butyl ether gave a limit of 100 p.p.m., and isopropyl ether one of over 300 p.p.m. With acetaldehyde, irritation of the eye appeared at 50 p.p.m., and some subjects objected strongly even to 25 p.p.m.

H. M. Vernon.


Methyl alcohol poisoning is due to the toxic effects of the methyl alcohol (m.a.) molecule and of formaldehyde and formic acid. The aim of treatment is to bind the m.a. molecule and to prevent its oxidation. The authors' original idea was to find a compound which contains the m.a. molecule as a normal constituent but has no toxic effect. The other constituent parts should be able to bind m.a. and thus detoxicate it, provided the synthetic substance is not toxic itself. De-toxication is best performed in the gastro-intestinal system before absorption has occurred. Pectins proved to have such characteristics. They form an important part of the cell membranes of green vegetables and fruit. The base of the pectin molecule is pectic acid, which is an arabinogalaeto-tetragalacturonic acid. The point of the investigation was to find out if the breakdown products of pectins could esterify m.a. by their free COOH groups. As pure galacturonic acid was not obtainable, the following considerations formed the
foundation of the experiments. The COOH groups of pectic acid are free and in the pectin molecule one galacturonic-acid group contains a free COOH radical.

(1) It should be shown in the Thunberg experiment that m.a. impairs the activity of the dehydrogenase in the gastric mucosa of the dog, for this effect is delayed.

If m.a. was applied together with a solution of pectin no impairment occurred. (2) In experiments in frogs, injection of a 15% solution of m.a. into the abdominal lymph duct in an amount equal to 104 to 105 mg. per g. of body weight just narcotized the animal. If an equal amount of powdered pectin was introduced no narcotic effect was observed. (3) When applied to the isolated frog heart a 20% solution of m.a. diminished the amplitude of beat quickly. This was followed by a short period of alternation and halving of the pulse beat, finally by stoppage in mid-position. This effect was reversible in some cases. A pectin solution neutralized with sodium bicarbonate did not influence the heart's action.

If m.a. and the pectin solution were applied together or if pectin and Ringer's solution were followed in the cannula by 20% m.a. the impairment was delayed and occurred in lesser degree. (4) Cats given 10 g. per kilo body weight of 50% solution of m.a. died within 2 to 5 days with severe symptoms of poisoning. If 50 ml. of a 2% solution of pectin was introduced through the stomach tube at the same time the toxic symptoms were much milder and death was delayed ; in a few cases the animals survived. (5) The m.a. content in the blood of cats was determined by authors' modification of Widmark's micro-alcohol method (to be published elsewhere). Six cats of 2,000 to 2,500 g. were given a sublethal dose of m.a. (6 g. per kilo in the form of a 50% solution by stomach tube). The blood m.a. curve was then studied, first at intervals of 10 minutes, later of 5 to 10 hours for nearly 9 days. Absorption took place within half an hour of administration and was completed after 3 hours. The blood m.a. content reached almost 8 parts per 1,000. After that the curve slowly and very gradually fell and the animal was free from m.a. on the seventh or eighth day. If with the m.a. 1 g. of marrow pectin was introduced (6 animals) the absorption and elimination time remained unchanged, but the maximum blood content did not exceed 5 parts per 1,000. The same applied when pectic acid was used.

The individual differences in the lethal dose of m.a. for human beings (30 to 100 g.) might be due to the varying amount of pectin substances present in the gastrointestinal tract from ingestion of green vegetables and fruit. This may mean on the one hand that fruit, especially apples, may be given as an antidiote in m.a. poisoning ; and on the other, excessive fruit intake may cause mild symptoms of m.a. poisoning if the pectin substances remain in the gastro-intestinal tract too long and are broken up. A polygalacturonic acid ("emostat") was studied by Scoz ; it can be given intravenously. This may prove useful for the parenteral treatment of m.a. poisoning.

V. C. Medvei.


The absorption of minute quantities of nitroglycerin through the unbroken skin, or the inhalation of fumes when dynamite is used for blasting purposes, produces headache. A transient immunity is acquired by contact with powder or dynamite. The headache and its associated symptoms are severe. A group of 10 men who were in intimate contact with dynamite (20% nitroglycerin) complained of intense throbbing headache, nausea, vomiting, and occasional tremors of the upper limbs. Consideration was given to the cause of the headache, to the degree of psychogenic element present in its development, and to its prophylaxis and mitigation by drugs. Patch tests using dynamite were performed on 15 men, and a few days later explaining of severe throbbing headache associated with a feeling of warmth over the face and some nausea. Ten subjects who handled dynamite were skin-tested with an intradermal injection of 0-01 mg. of histamine, and approximately 90% developed a marked cutaneous reaction. In one subject the headache described under the influence of dynamite was reproduced. Histamine headache is stated to be due to dilatation of the intracerebral vessels; the author believes that the headache produced by contact with nitroglycerin is closely analogous. In the subjects examined dilatation of the retinal vessels and a substantial hypotension were noted. Relief of the headache requires a drug with vasocostricting and pressor effects which subsequently tends to elevate the cerebrospinal-fluid pressure.

The experiments were carried out with 50 mg. of 20% nitroglycerin; cases of dynamite poisoning have been reported. Any handled dynamite were given 5 mg. of amphetamine sulphate orally in the early morning and 10 mg. at noon for 3 days before initial contact with dynamite. None complained of headache after 3 hours of continuous exposure to 20% nitroglycerin. Acetycholine has similar physiological properties to histamine, but is believed to be a factor in producing headache, which can be lessened by an inhibitor of cholinesterase such as prostigmin. The reaction to histamine is reduced by mobilization of the acetycholine reserves. Only 20% of a group of men exposed to dynamite after taking increasing doses of prostigmin complained of headache at the completion of a full day's work. Various drugs were tried for the immediate relief of the headache produced by dynamite. Analgesics, such as aspirin, phenaecin, codeine, and the barbiturates, were without benefit and in many cases increased the severity of the headache and other symptoms. Adrenaline produced transitory relief, as did ergometrine hydrochloride. Ergotamine tarrate produced lasting relief in 40% of subjects, and a transient effect in 60%. The greatest relief was obtained by an intramuscular injection of 0.5 g. caffeine sodium benzoate followed by 5 to 10 mg. amphetamine sulphate orally. A moderate rise in the systolic blood pressure with marked relief of the headache followed this procedure.

A. Thelwall Jones.


Workers engaged in the dehydration of onions complained of undue irritation of the eyes, nose, and throat. The operations consisted in peeling the onions and feeding them into a peeling machine which embodied a strong spray of water with centrifugal action to remove skins. The peeled onions were fed into a slicing machine, and the slices dropped from the machine onto a moving belt and then on to wire trays, where they were spread out by hand. The trays were loaded into racks, which were then placed in a drying tunnel for dehydration. It seems fairly well established that volatile onion oil consists essentially of allyl propyl disulphide—(CH₃H₂)₄S₃—and diallyl disulphide—(CH₃H₂)₅S₂—and it is reasonable to assume that the concentration of these substances in air is a fairly accurate index of the contaminants produced. The two substances mentioned are virtually identical in molecular weight, and presumably have similar toxicological properties, so that it
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may be assumed, for purposes of discussion, that the sole component of onion oil is allyl propyl disulphide. Air samples taken at the onion-peeling machines were found to contain 23 parts per million (p.p.m.) of this substance, directly over the slicing machine 3-4 p.p.m., and on the spreading trays 2 p.p.m. It is concluded that the maximum allowable concentration of the sulphide is 2 to 3 p.p.m. The amounts observed in the plant could be reduced by suitable exhaust ventilation.

H. M. Vernon.


The position in the periodic table of the 20 elements forming volatile hydrocarbon hydrides is discussed. Numerous data are given showing their chemical and physical properties and their smell. All the hydrogen halides are intensely irritating, hydrofluoric acid being about as toxic as hydrochloric acid. In contrast to the halogen hydrides, the hydrides of sulphur, selenium, and tellurium act as secondary irritants in lower concentrations, and exert systemic effects at higher levels. They all have unpleasant smells and three of them—hydrogen selenide appears to be more toxic than hydrogen telluride. The very unstable polonium hydride (H₂PO) also falls in this group. The next group includes the familiar ammonia, phosphine, and arsenic, the less familiar stibine (SbH₃), and the extremely rare gas bismuthine (BiH₃). Phosphine (PH₃) is much more toxic than ammonia, causing dyspnea and convulsions. Stibine has a marked toxic action of the same order as that of arsenic; it is a powerful hemolytic agent, dogs and cats being particularly susceptible. Guinea-pigs are less so, but their erythrocytes often show changes in a few minutes. They may show tiny spicules extending symmetrically round the periphery, and have been called "spine cells." Heparinized guinea-pig blood, when treated in vitro with arsenic, stibine, hydrogen selenide, and hydrogen telluride, also shows these spine cells.

The carbon hydrides—methylene, ethylene, and acetylene—all act as simple asphyxiants when mixed with air, but ethylene and acetylene possess anaesthetic action when diluted with oxygen. The hydrides of silicon (SiH₄) and SnH₄ have a low toxicity, but those of germanium (GeH₄), tin (SnH₄), and lead (PbH₄) appear to be quite toxic. The two hydrides of boron (BH₃ and B₂H₆) are not highly toxic.

H. M. Vernon.


Hieger deals with the chemical aspect of carcinogenic hydrocarbons and their action on mouse skin as a simplified model of the action of tar and pitch on the human skin. He cites the work of Kennaway, and traces the steps which led to the discovery of these hydrocarbons, pointing out that the cancer-producing potency depends on the chemical composition and the dosage. There are at present, some 300 recognized carcinogens of varying potency. Trivial changes in constitution bring about enormous variations in potency. The mechanism by which cancer is produced is discussed.

Henry deals with the relation between pitch, tar, and tarry products and epithelioma of the skin and its sites. He discusses the course of the condition and its behaviour and analyses the notified cases. The site at which the lesion occurs depends on the nature of the patient's occupation and the chemical properties of the substance, though individual causes modify these. Pitch and tar produce lesions in a shorter time than mineral oil.

There is a short account of the clinical features by Ross. Winternitz describes treatment by X rays, and points out that "the combination of education of the patient, vigilance of the industrial medical officer, and accessibility of the tumour, produces a 100% cure rate." Short-distance low-voltage therapy has supplanted treatment by radon. He analyses 449 cases treated at the Royal Cancer Hospital, London. Of these, 348 had benign lesions and 39 malignant, while 62 patients had both benign and malignant growths. Of the patients with malignant tumours 19 had two or more malignant growths, but only in one case was it necessary to treat regional lymph nodes.

M. H. Jupe.


Two cases of dichloroethane (CH₂Cl₂·CH₃Cl) poisoning, one fatal, are reported. In both cases the substance was taken by mouth as an intoxicant. In the fatal case death occurred with signs of respiratory and circulatory failure approximately 5 hours after the consumption of an unknown quantity of dichloroethane. The post-mortem findings were: severe hyperaemia and superficial necroses of the mucous of the stomach and small intestine, acute pulmonary oedema, diffuse fatty degeneration of the liver, fatty degeneration of the myocardium, cloudy swelling of the renal tubules, acute venous congestion of liver, kidneys, brain, and leptomeninges. Dichloroethane was obtained by distillation from the contents of the stomach and intestines. The clinical findings in the patient who recovered were: diarrhoea and vomiting, blood in the stools, tachycardia with extrasystoles, low blood pressure, proteinuria, high blood urea, enlarged liver and impaired liver function. The patient recovered in about a fortnight.

G. Popádě.


The clinical findings in about 50 cases of eye injury occurring in workmen exposed to quinone vapour and hydroquinone dust are summarized. Hydroquinone is used as a photographic developer, a dye intermediate, and in various chemical syntheses. A good deal of the industrial manufacture is carried on in closed vessels so that there are leakages at numerous points. The oxidation-reduction system of hydroquinone—equinone is a relatively labile one, and both products are present in the workrooms, causing continued eye irritation, as shown by conjunctivitis, photophobia, moderate lacrimation, and a burning sensation. Injury to the eyes, involving conjunctival staining and corneal staining and opacities, has been reported previously by several investigators. In the present observations the corneal injury was found to be of two types: (1) a diffuse greenish-brown stain chiefly in the superficial layers of the cornea and confined to the interpalpebral fissure; (2) greyish-white opacities varying in size and shape from very fine, translucent, and highly refractile dots to larger, confluent, and branching flecks. The opacities may be found throughout the substantia propria and may involve the deeper substantia membrane. The conjunctival lesion is a pigmentation
in the interpalpebral fissure, varying from a slight diffuse brownish tinge to a dense brownish black. The pigment deposit occurs in the form of spheres, some of which are quite large, and is most marked in the older patients of long employment. Some of the characteristic lesions are illustrated by coloured plates. Repeated measurements of visual acuity were made on all the employees. In a few cases there was an appreciable loss of acuity, due especially to acute corneal irritation. As this subsided vision improved, but it is doubtful if there would be much improvement in cases where the defect was due to the greyish-white intra-conveal opacities. Numerous blood counts and estimations of haemoglobin, sedimentations rate, and icterus index were made, but they did not reveal any evidence of systemic injury. It was concluded that quinone vapour is probably the major factor in the production of the lesions described. The stain is an end-product of the oxidation of quinone to hydroxyquinone and the subsequent polymerization of this substance to humic acid (C₉H₆O₃).

H. M. Vernon.


Various methods of quinone analysis were investigated, and in the one adopted air samples taken in the quinone plant were passed through 10 ml. of isopropyl alcohol in a midget impinger. To the alcohol solution was added a solution of chloroform (final concentration 0.02%) in potassium hydroxide (final concentration N/25). Colour development begins immediately and is stabilized in an hour or two. Comparisons were made with standards at 520 μm by means of an Evelyn colorimeter, and these results were compared against a graph obtained with known quinone concentrations.

In the manufacture of quinone, aniline and sulphuric acid are mixed in large tanks. The mixture flows to oxidation tanks where manganese dioxide is added in order to complete the oxidation to quinone. The quinone is distilled from the mixture and reduced to hydroquinone with the aid of iron. The reduced mixture is run through filter presses and the filtrate passed into crystallizers, thence to centrifuges and dryers. The amounts of quinone encountered at various stages of manufacture varied from 0.01 to 3-2 parts per million (p.p.m.), but the high values obtained at first were subsequently reduced by more effective ventilation and isolation of the operations which produced the high concentrations. The odour of quinone becomes perceptible at 0.1 p.p.m., is definite at 0.15 p.p.m., irritating at 0.5 p.p.m., and markedly irritating at 3.0 p.p.m. A value of 0.1 p.p.m. has been selected as a tentative maximum allowable concentration of quinone vapour.

H. M. Vernon.


The method of Fujiwara for the determination of carbon tetrachloride depends on the production of colour in the pyridine layer of a two-phase system, the lower phase of which is sodium hydroxide solution. It was subsequently found that colour production could be obtained in a one-phase system with a special mixture of pyridine and sodium hydroxide is employed. The reaction was brought about by mixing 10 ml. of a pyridine-sodium hydroxide solution with 5 ml. of an acetone solution of carbon tetrachloride in a 25 x 150 mm. test-tube. After being heated for 15 minutes in a water bath at 70 °C, the tube was immersed in cold water for 1 minute, and transmission of the solution was determined by means of a Coleman universal spectrophotometer, with a wave-length of 540 millimicrons. A number of control observations were made in order to ascertain conditions, and analyses of air containing 50 to 209 p.p.m. of carbon tetrachloride showed an average recovery of 96 to 105%.

H. M. Vernon.


Gastro-intestinal symptoms are almost invariably present in carbon tetrachloride poisoning. In the 2 cases here reported duodenal ulcer followed promptly on severe exposure to the poison. There had been no previous history of digestive disturbance in either subject. In the first case a man worked for 6 weeks in a small room cleaning metal parts by dipping them in a 3-gallon tank of carbon tetrachloride and then spreading them on a bench to dry. He gradually developed general malaise, and finally vomited large amounts of blood and collapsed. The blood haemoglobin was 73% and 3 days later was 54%. From x-ray examination a duodenal ulcer was diagnosed. In the second case a man worked for 2 days in a small room on the purification of a substance by stirring the latter with carbon tetrachloride in a drum open at the top, and running off the mixture into open pails. The drum was cleaned between the batches by scraping. After a 12-hour shift the man suffered from persistent vomiting, and 8 days later he developed severe epigastric pain and board-like rigidity of the abdomen. An operation revealed a small ruptured duodenal ulcer.

H. M. Vernon.


Substances used in the application of varnishes are the cellulose ethers, the solvents and diluents, the resins which give brilliance, and the pigments. The gun spray method of application is rapid and cheap, but the concentration of the vapours may reach a dangerous level.

The authors investigated conditions in a shop employing 20 workers. The most frequent complaints were of gastric, pharyngitis, headache, and weakness. Fifteen patients were anemic. All employees were women and 12 had menstrual disturbances. The liver was enlarged in 7 cases. Symptoms were more common in those who had worked 5 years or more. During the war most of the work had to be done with a brush or a rag and only recently had spray-guns been used again and a proper system of exhaust ventilation been installed. It was thought that acetone accounted for many symptoms, for it comprised more than half the mixtures used. Butyl and ethyl acetate were present in smaller quantity. As a narcotic substance acetone has an affinity for lips and is likely to damage the nerves. Persons suffering from chronic acetone poisoning lose weight, become anemic, and have urobilinuria. In experimental animals degenerative changes in liver, kidneys, and suprarenals have been noted. The aliphatic esters of acetic acid irritate mucous membranes.
and the air passages more than acetone but are less narcotic. It is concluded that in the group investigated most of the symptoms were due to acetone and the acetic acid compounds.

G. C. Peter.


Difficulties in the adsorption methods hitherto employed for the determination of organic vapours in air have been overcome by the investigators in so far as they relate to halogenated organic vapours. Their method depends on the employment of activated charcoal, which was made by mixing light oil with lamp black and sucrose to form a putty-like mass, and heating it to 800° C, for 20 hours. When cooled it was passed through sieves, and activated by heating to 875° C for 35 minutes in a current of steam. A measured volume of the air to be analysed was drawn through a sampler tube (6 by ⅛ inch; 15 x 1-9 cm.) filled with activated charcoal which absorbs the halides. The sample was analysed by combustion in a stream of oxygen in an electric furnace. The chlorine liberated was absorbed in a bead-column absorber containing an aqueous solution of sodium sulphite and sodium bicarbonate.

The accuracy of the method was tested on samples containing 1 to 51 mg. of chloropicrin. From them 98-4% of the chloride was recovered on an average. Tests made on samples of mustard gas weighing 1-8 to 9-7 mg. showed an average recovery of 99-3%. The method has been used in many types of field sampling of mustard-gas vapour clouds and in determining chamber concentrations.

H. M. Vernon.


The action of diethylene glycol monoethyl ether ("carbitol") was determined by administering it in several ways to animals. The lethal dose was about 6 ml. per kilo in rats and mice when administered intragastrically, subcutaneously, or intravenously, but less than one-third of this when administered intraperitoneally to mice. For other animals it appeared more toxic. Dilution with an equal quantity of water doubled the lethal dose, and this suggests that irritation was a factor in the higher toxicity of the undiluted agent. As regards ethylene glycol, the lethal dose varied considerably with the species of animal and the method of administration. Intragastrically in rats, mice, and guinea-pigs it was the same as, or higher than, that of carbitol, but subcutaneously in mice and intravenously in rats it was roughly half, and intravenously in rabbits about double. The lethal dose of diethylene glycol tended to be higher than that of carbitol and ethylene glycol.

In unanæsthetized animals symptoms were usually not demonstrable until more than 1 ml. of carbitol per kilo had been administered. Ataxia with an initial increase in respiration rate followed by a decrease occurred with doses of 2 to 2-5 ml., while depression, coma, and death resulted with 3 to 5 ml. There might be recovery in 1 or 2 hours from coma up to 4 ml., but with larger doses coma lasted 24 to 48 hours, generally without recovery. When the animals were anæsthetized with pentobarbitone the intravenous injection of carbitol caused an immediate but brief fall in blood pressure and slowing of the heart. Respiration was depressed in rate and amplitude; with higher doses it stopped but returned with artificial respiration.

H. M. Vernon.


Over a 100 cases of mercurialism occurred in two factories in Italy in which felt hats were made. The authors describe 10 cases which were investigated. The air in parts of the works contained much more than 0-1 mg. mercury per cubic metre, which is supposed to be a tolerable concentration.

Tremor, rapid and vibratory with from 5 to 8 movements a second, occurred in all 10 cases. In some it was present when the limb was at rest, but it ceased in sleep. If the patient was asked to put out the tongue the tremor of the upper limbs ceased for a moment. The execution of a planned movement was associated with an intention tremor. Mercurial tremor is essentially static. The movements in the legs were slower and of smaller amplitude than those in the arms. After the hands, the eyelids and tongue were the parts most often affected. Tremor was often interrupted by clonus, and sudden nocturnal movements, as distinct from tremors, were observed during sleep. There was evidence of extrapyramidal lesions in some patients or of involvement of other parts of the nerve axis. One had impaired co-ordination of the lateral eye movements. Some had sensory disturbances affecting tactile sensation and postural appreciation. The psychic changes included a greater degree of emotionalism; some patients were quarrelsome and others depressed, restless, and intolerant of opposition. Some had suicidal ideas.

It seemed that the cortex and the extrapyramidal system were particularly involved in all, which explains Charcot's view that many symptoms of mercurialism were hysterical. In addition to the dyskinetic and hyperkinetic phenomena, others were noted of an kinetic-hypertonic quality from involvement of the globus pallidus. The references to these latter changes are rare in the literature. In 1935 Francioni carried out animal experiments which revealed lesions of the basal ganglia after mercurial poisoning. These lesions were more numerous and severe than those seen in the cortex.

G. C. Peter.


Poisoning with nitrous fumes has not previously been reported in Denmark. The first case occurred in an office cleaner, aged 43, who poured some concentrated nitric acid intended for cleaning purposes into a zinc pail. Dense red fumes were emitted to which the patient was exposed for several minutes. After an interval of several hours difficulty in breathing began, increasing to dyspnoea with cyanosis next morning, when the patient was admitted to hospital. There were coarse rales throughout the chest; the pulse was 115 and regular. Digitalis, oxygen, and intravenous glucose were given. Four hours later the patient's condition was worse, venesection was carried out, and strophanthin and atropine given. On the third day the patient died in convulsions. There was oedema of the lungs and bronchial mucosa. In the second case an apprentice, having spilt some nitric acid
on the floor, endeavoured to soak it up with sawdust, which caused quantities of red fumes to be evolved. Apart from cyanosis he felt well for several hours, when dyspnea and pains in the chest developed; he was admitted to hospital next morning. He was cyanosed and his pulse was rapid. Treatment was rapid and superficial with audible rales. Treatment consisted of venesection and administration of strophanthin and intravenous glucose. He improved with repeated venesection, and recovery was complete by the second day.

D. J. Bauer.


Finerty and Grace showed that potassium fluoride in drinking water will antagonize arsenic trioxide given in lethal amounts to rats, and thus prevent death in some 85%. Similarly cryolite is found to be capable of detoxicating soil poisoned by lead arsenate.

To determine the effect of cryolite on lead toxicity in animals, young white rats were fed on a standard diet to which 2,500 p.p.m. of lead arsenate was added. Some of the smaller rats died in 3 days, and all died within a week. When, however, cryolite was added at the rate of 5,000 p.p.m. all the 5 animals tested were alive at the end of 5 weeks. During this time they gained an average of 56 g. in weight, while the control group 96 g., and rats receiving a diet to which cryolite alone had been added gained 91 g. The mechanism of the action is discussed. It is remarked that both arsenic and fluoride are present in sea water up to 1 p.p.m. and sea foods are known to be rich in both elements.

H. M. Vernon.


In cases of poisoning of human beings by methyl chloride, achromia, anaemia, and liver and kidney damage are sometimes observed. The present investigation was carried out on dogs, exposure being continued for 6 hours a day and 6 days a week. Observations on the blood, liver function, kidney function, blood sugar, cerebrospinal fluid, and formic-acid excretion failed to reveal systemic damage which might account for death from methyl chloride poisoning, and none of the tests applied to poisoned animals would be of use in the diagnosis of the condition. No evidence was obtained in the formation of methyl alcohol or of formic acid as metabolic products of methyl chloride, as suggested by several investigators.

H. M. Vernon.


The author reports what is believed to be the first case of fatal poisoning by “lethane 384,” an insecticidal hair-oil preparation. A 55-ml bottle was found empty by the side of a woman of 35 who had undoubtedly deliberately swallowed the contents during a period of depression. She was already dead. Her weight was approximately 8 stone, and she had probably taken some 3-5 ml. of N-butyl carbitol thioycanate and 10-3 ml. of lauril thioycanate (or more correctly B-thioycoethanol laurate) in 50% refined paraffin. Cameron and others (J. Path. Bact., 1939, 49, 363) and Main and Haag (Industr. Med., 1942, 11, 531) have demonstrated the toxicity of these substances to mammals. Lethane 384 appears to be toxic in a dose of between 0-025 and 0-2 ml. per kilo body weight. Apart from a smell of citronella in the stomach contents and slight irritation and hyperemia of the gastric and duodenal mucous membranes, no specific changes were seen at necropsy. Death had apparently been caused by central respiratory failure. At present the poison is not listed and, therefore, not marked "caution" by label, although by law it is warning "For external use only" and "Not to be taken."

Keith Simpson.


Fifteen persons were taken ill one evening after having eaten at 1.00 p.m. some cabbage prepared with sodium nitrate instead of cooking salt. Six died within 2 hours, 3 more on the way to hospital, and 1 immediately after admission. The survivors’ most prominent symptom was cyanosis, particularly of the face, hands, and ears but in some cases of the whole body. The most severely affected patients also vomited. In 2 cases the vomiting was followed by convulsions, succeeded by coma and death within 2 hours. Administration of oxygen did not appear to relieve the condition. Post-mortem examination showed that the blood was thick and chocolate-brown and contained methemoglobin; the cerebrospinal fluid was light brown; the spleen was enlarged and congested; the liver was slightly enlarged and the kidneys showed moderate nephrosis and occasional corpuscular casts. Another patient died on the fifth day after an incompatible blood transfusion followed by renal failure, which was not relieved by decapsulation. Post-mortem examination revealed degenerative changes in the liver and circulatory disturbances in the brain. The 2 patients who recovered had dark serum and urine for some days; methemoglobin was found in the former, but not in the latter; the urine contained blood and albumin. Both were discharged on the seventh day.

The author suggests that the reduction of nitrate to nitrite by the bacteria of the gut was facilitated by the presence of carbohydrate from the large quantity of cabbage consumed, and that the symptoms observed were those of nitrite poisoning, the long latent period after the meal being due to the gradual reduction in the alimentary canal. Diagnosis of nitrite poisoning should be based upon cyanosis and the presence of methemoglobin in the blood, and should be confirmed by tests for nitrates and nitrites in stomach washings and urine. Treatment consists of stomach wash-outs and administration of laxatives.

B. Nordin.


All solvents used in dry cleaning have an affinity for grease and fats and are readily soluble in nerve tissue. Trichlorethylene is probably used more than any other chemical. It is not inflammable and as a cleanser is effective, but it decomposes in contact with a naked flame and liberates phosgene. It is economical and can be recovered almost quantitatively with suitable apparatus. A hundred parts per million is said to cause intoxication in man, and two parts per thousand will produce anaesthesia. Some workers in cleaning plants develop a craving for trichlorethylene and carry about with them small amounts which they inhale.
ABSTRACTS

In most cleaning plants the articles are put into a container in which is a quantity of solvent and then agitated by mechanical means. The vapours are then driven off by fans and later mixed with steam and carried to condensers, in which they are recovered. The process lasts from 10 to 20 minutes. Various methods have been employed to determine the quantity of solvent in the air, of which that perfected by Moskowitz and Burke is probably the most effective. Colloidal silica is used to adsorb the vapour. Rocco thinks this method too fine for ordinary purposes and prefers a method based on Beilstein's experiment. In this use was made of the observation that halogen derivatives are readily decomposed in a flame, liberating halogens, and these in contact in the same flame with copper oxide give a bluish-green colour. The author uses a lamp similar in design to the Davy lamp, with a glass and a coil of copper wire fixed above the burner. Alcohol is the fuel. The top of the glass is covered with wire mesh so that it can be employed with safety in a fairly inflammable concentration of vapour. The colour of the flame indicates the amount of leakage at different parts of the plant which is to be inspected. The air is drawn into the lamp by a tube with a mesh guard. If the contamination of the air is slight the flame has a greenish tinge, which corresponds to 0-1 to 5 mg. of trichlorethylene per litre; if the flame is blue it indicates 5 to 20 mg., and if a reddish colour something higher than 20 mg.

The author does not describe the plants he has examined, but it is stated that all the plants examined in Turin a noxious concentration of vapour was escaping and spreading into surrounding property. Filters have been used impregnated with almond oil which absorbs the gas; activated carbon filters have also been used for the same purpose. Some of the workers suffered from headache, vertigo, and confusion. All apparatus should be totally enclosed, and it is necessary to make the condenser highly efficient to prevent loss to the outside air. The use of filters should be compulsory in order to protect operatives and the public from any vapour which may have passed the condensers.

G. C. Pether.

INDUSTRIAL PHYSIOLOGY


Five men and 1 woman, aged 14 to 37 years, trained to work on a bicycle ergometer, were given a meal of 1,050 calories derived from (a) 13%, 11%, and 76% and (b) 37%, 50%, and 13% of protein, fat, and carbohydrate respectively. Two to three hours later they had worked to complete exhaustion, and after a 10-minute rest worked again to exhaustion. During the whole period the expired air was collected; blood samples were also taken. The amount of work done was measured and the muscular efficiency calculated.

The work output, muscular efficiency, and percentage recovery were not significantly different after the two meals. The blood sugar after the high-carbohydrate meal before exercise began was 145 mg. per 100 ml., fell to 106 after exercise, and rose to 123 after a 30-minute recovery period; after the low-carbohydrate meal the values were 125, 118, and 122 respectively. The respiratory quotient after the high-carbohydrate meal was higher throughout by from 0-1 at rest to about 0-03 during recovery and the blood lactate was also higher throughout by from 6 mg. in rest to about 3-5 mg. after exercise. These differences are taken to mean that more of the energy for work production was derived from carbohydrate after the high-carbohydrate diet. No age or sex differences were observed, except that a boy aged 14 did 20% more work, and the woman 35% less work, than the 4 adult males. No hypoglycaemic reactions were observed after the high-carbohydrate meal.

H. E. Magee.


Kitchen workers are often in an environmental temperature of 25 to 30° C. and at times even 55 to 60° C. The incidence of circulatory disorders in them is higher than in people not exposed to great heat. Atheroma of the aorta and cardiac hypertrophy are the most frequent abnormal findings. Blood pressure may be above or below average. Tachycardia is so common as to constitute an occupational disorder. As there is often a rapid alternation of exposure to heat and exposure to cold, spasm and relaxation of the peripheral vessels must occur frequently. This is considered to be a contributory factor in the genesis of arteriosclerotic changes. The quantity of circulating fluid must likewise vary at short intervals, since persons exposed to heat take large amounts of fluids; however, there is rapid adaptation to this intake and its importance should not be over-stressed. Among 41 patients examined, 14 had evidence of cardiac hypertrophy and 7 had some enlargement of the aorta of sclerotic type together with cardiac hypertrophy. In 36 the blood pressure was raised above normal and 32 had tachycardia. Many of these changes have been observed in other industrial workers exposed to great heat. Kitchen workers have sometimes to enter refrigerators, so their vasomotor system is really exposed to great variations of temperature. The pathological changes noted may not bring with them any serious incapacity for many years.

G. C. Pether.


A group of workers who had never had any other employment but milking were found to have changes in the terminal interphalangeal joints of the index and middle fingers of both hands. These showed chronic arthritic signs and deviation of the terminal phalanx to the radial side. The author considers these deformities to be of occupational origin, and that if, as in Cremona, the patients had been taught a proper technique of milking they would not have them. The milker should not have his head pressed against the flank of the cow, but should sit upright. The teat should not be squeezed between thumb and forefinger to expel the milk; the thumb and finger should be closed round the base of the teat and the remaining fingers then closed in succession. The joint changes described could thus be prevented.

G. C. Pether.


An oxygen rebreathing apparatus was developed during the wars of 1939-45 for the use of free underwater swimmers. Divers are exposed to great pressures. Pinching of the nostrils and a mild expiratory force...
will normally blow air through the Eustachian tubes and equalize the pressure on the two sides of the tympanic membrane; if this is not achieved pain will be felt in the unequalized ear at a depth of 15 ft. If this pain is ignored rupture of the membrane and of congested blood vessels may result. There may be severe pain in the air sinuses and similar haemorrhage. For each 33 ft. of descent there is an increase of 1 atmosphere in the partial pressure exerted by the pure oxygen and at high partial pressures the gas becomes toxic. At 66 ft. generalized nervous excitability develops after about 30 minutes. There is a sense of impending danger and trembling of the hands, with abruptness of inspiration, which, in a few minutes, becomes a series of staccato jerks. This may progress to spasm of respiratory muscle, which opposes both inspiration and expiration. Dyspnoea becomes severe and vision blurred, and twitching of the face results. The mind remains clear. The symptoms occur more slowly at less depth and are relieved immediately the diver ascends. If a beginner holds his breath in ascent, preventing the escape of expanding air, a lung may be ruptured. "Bends" cannot arise as a result of oxygen poisoning with an oxygen rebreathing apparatus because pure oxygen and not air is inhaled. The absence of hose to the surface and the presence of a safety valve on the mask mean that "squeeze" cannot occur.

In temperate waters the low temperatures place a limit on the capacity of the diver to work. Clothing may prolong the time but may make swimming impossible. Daily diving predisposes to otitis externa. When the apparatus is used for fire fighting or mine rescue the increased carbon dioxide from muscular exertion may cause symptoms if the worker neglects to refill the canister with soda lime with each change of oxygen cylinder. The dust from either the soda lime or the "baralyme" may be inhaled, and this may result in a mild chemical irritation of pulmonary passages if the dust is not sifted or blown from the absorbent before it is put in the canister.

Asphyxia can result from excess of nitrogen in the breathing apparatus if the oxygen supply fails. This is not associated with distress; a sensation of well-being occurs, with, later, mental confusion, which prevents the worker from overcoming his difficulty. Unconsciousness and death may follow. This can be prevented if the breathing bag and lungs are cleared of air before the circuit is closed to breathe oxygen. The absence of excess nitrogen then makes this form of asphyxia impossible.

K. M. A. Perry.


Investigations were carried out in four factories where workers were fettling duralumin castings of Aero engines using electrically cable-driven rotary cutting tools with speeds of 1,100, 2,800, and 6,000 revolutions per minute. The size of the cutting burr depended upon the nature of the work to be done. Out of 282 workers examined in one factory 186 exhibited signs of "dead hand", while in another, 40% of 300 workers were affected.

The syndrome was induced by cold and began with blanching of one or more fingers accompanied by a feeling of deadness and loss of sensation. In 63 men and 4 women this was followed by cyanosis. The duration of an attack was generally less than half an hour. The average duration of work before the onset of symptoms was 23 months, but in some cases it was only 6. The condition is precipitated by cold, and the disablement is not easy to assess because the sufferer is only prevented from carrying out certain type of work for short periods on certain days. It is not known how permanent the condition is, but it has been observed to persist, but not progress, for up to 4 years after work with rotary tools has been given up.

For men the prevalent measure is the restriction of the length of time for which a man may work with the tools—an almost impossible measure for industry to adopt owing to the need for continual training of new workers. Investigations are being carried out into the possibility of providing some form of shock-absorbing grip to the tools. Continuous work on high-pressure piece work, continuous use of the tool on a 24-hour shift system preventing the proper servicing, and unduly tight gripping of the tool by the worker appear to be special factors which predispose to the syndrome.

K. M. A. Perry.

INDUSTRIAL LUNG DISEASES


Eighty glass-blowers were examined. The pressure and its duration while glass vessels were being blown were studied. A decrease in the functional capacity of the lungs becomes apparent after 10 years and is more pronounced after from 20 to 30 years' work. The youngest glass-blower with emphysema was 46 and had been at work 30 years. Emphysema was found in 55% of those working for from 30 to 40 years. There is no legislation in Czechoslovakia to provide compensation for this complaint. By more careful selection of recruits those liable to develop emphysema could be excluded.

G. M. Findlay.


An analysis was made of 2,794 consecutive cases of pneumonia observed in about 66,000 ship-yard employees from September, 1942, to May, 1945. The annual incidence of pneumococcal pneumonia for the 32-month period was 12.4 per 1,000. For 1943 alone it was 11.5 and for 1944, 14.2. The independent series of statistics maintained by the ship-yard personnel office showed only half as high an incidence; this was because the figures were calculated for periods of absence longer than 1 week, and many of the conditions were diagnosed as influenza, bronchitis, or colds, while the pneumonia was undiagnosed. The average case fatality for pneumococcal pneumonia was 5·8%, but a precipitous fall occurred in the second quarter of 1944 when penicillin became available. In the last 12-month period the rate was only 1·1%, as compared with one of 9·5% in 1943. The frequency of pneumonia in workers employed under 1 year was 16·0 per 1,000, as compared with 10·2 in those employed over 1 year: the case fatality rate, however, was independent of the length of employment. Nearly a quarter of all the workers were women. No significant differences were observed in the annual incidence rates in the two sexes, or between male welders, female welders, and all workers. However, the annual death rates for male ship-yard workers were 3·5 times higher than those for women. The incidence of pneumonia increased with age, and more than 50% of the patients were over 40 years. The mortality rate for workers over 40 was 5 to 10 times higher than that for workers under 30. The
incidence in negroes was 60% greater than that in white patients, but there was no significant difference in mortality rates.

Data are given of certain factors essential for evaluating prognosis in cases of pneumonia. They relate to the presence or absence of bacteriemia, the number of organisms in the sputum, the extent of lobar involvement, the length of illness before the patient entered hospital, and the severity of associated diseases. The factors observed in ship-yard welders differed in no way from those observed in all ship-yard workers.

H. M. Vernon.


The 544 cases of lobar pneumonia admitted to the Northern Permanent Foundation Hospital of Vancouver, Washington, during one year are statistically reviewed. They relate to workers of the Kaiser Shipbuilding Company and to some of their families. In the total of 20,500 employees concerned the incidence of pneumonia was 23.6 per 1,000, but in the 17,843 employees who lived with their families it was only 20.4, as against an incidence of 46 in the 2,607 employees living in dormitories. This latter number contained a large proportion of transient workers who lived in single rooms and had inferior care for their respiratory infections. The 3,932 adult family members investigated had an incidence of only 4.8 per 1,000. The incidence of pneumonia differed considerably in the various shipyard crafts. Painters showed the high rate of 42.5 per 1,000, and chipper of 32.4. On the other hand, electricians had a rate of only 12.4, and clerks, who worked indoors all the time, of 2.1.

H. M. Vernon.


Models were constructed from sections of normal lungs containing the usual quantities of carbon, from the lungs of an ironstone miner, and from the lungs of foundry sandworkers. Inert dust, carbon, and iron were most concentrated around respiratory bronchioles, especially at their first point of division. Around infundibula there was dust only at the points of contact with arterial branches. No deformation of the bronchoalveolar structure resulting from anthracosis or siderosis was discovered. [Emphysema is not mentioned.]

Silicosis from the dust is found around respiratory bronchioles, around the arterial branches that accompany the bronchial divisions, and in the interlobular septa. The distribution around respiratory bronchioles is similar to that of inert dusts, but is accompanied by marked proliferation of the connective tissue. There is a constant mantle of hyperplastic connective tissue around the arterial branches; characteristic hyaline silicotic nodules are formed almost exclusively in the adventitia of the very small arteries close to branches of the respiratory bronchiole. The very small arteries run through these nodules. In some cases, especially in the subpleural zones, there is a considerable proliferation of dense connective tissue in the interlobular septa. This is laminated and not nodular, and it encircles branches of the pulmonary vein and sends long laminae of increase in the adjacent infundibula. The fibrosis resulting from silica often produces distortion with narrowing of the bronchioles.

The authors conclude that silicosis differs from anthracosis and siderosis not only in the marked connective tissue proliferation at the usual sites of dust accumulation, but also in the presence of hyaline nodules against the arterioles and of a laminated perivenous fibrosis in the interlobular septa. They think that the formation of typical silicotic nodules is evidence of a local tissue disposition in the arterial adventitia, and they explain the interlobular fibrosis as resulting from the strain placed upon the secondary lymphatic channels connecting the periarterial to the perivenous lymphatics when the main normal paths become blocked. This is especially evident in the sub-pleural layers, where these anastomoses may provide a collateral lymph circulation because of their connexion with the pleural lymphatic network.

[The illustrations are not useful.]

H. E. Harding.


X-ray diffraction is an accurate and convenient method for determining the amount of quartz in dust and lung tissues that may contain free and combined silica. The method also demonstrates the presence of two other forms of free crystalline silica, namely cristobalite and tridymite. These forms are the result of crystallization of the silica at different temperatures. Above 870° C. tridymite is formed and, at higher temperatures, cristobalite. In pottery and ceramic industries large amounts of cristobalite, and sometimes tridymite, are produced artificially; both these forms of silica are natural constituents of certain volcanic rocks. They are more soluble than quartz, and will produce silicotic tissue reactions more rapidly than quartz. It is maintained by the investigator that the detection of much of them in the tissues is therefore indicative of unusual hazard, and a warning of need for special precautions in control, but he points out that some conversion may occur during the preparation of dust or tissue samples for analysis. Experiments demonstrate that conversion of quartz to cristobalite can take place in 10 to 30 minutes at 150 to 1700° C., provided that the particles are small or a flux (such as alkali oxides) is present. Some of the quartz samples, after regrinding and heating a second time, were found to contain tridymite. Conversion of silica minerals in powdered samples before examination can be avoided by removing soluble fluxes before ignition and by keeping ignition temperatures below 1,000° C. It is recommended that destruction of free silica minerals in lung tissue be avoided by substituting a peroxide treatment in place of the usual ashing process. To a small quantity (5 g.) of the moist tissue, placed in a 250 ml. beaker on a water bath, 30% peroxide is added in small quantities at a time, and the treatment is continued for 10 to 25 hours, when the organic matter will have been destroyed. After evaporation to dryness 5 to 10 ml. of concentrated HCl is added, and after an hour the residue is filtered, washed with dilute acid, ignited, and weighed.

H. M. Vernon.

In a study of 103 Belgians with silicosis the author found a tendency to anaemia and leucocytosis with granulocytosis in advanced and complicated cases, but he does not consider these findings helpful in diagnosing tuberculous infection. Reports of eosinophilia and of a shift to the left in the Arnett count were not confirmed in his cases. Leucocytic granules were abnormally large in the pseudo-neoplastic and tuberculous cases. The erythrocyte sedimentation rate was of great help in detecting tuberculous infection, but was slightly raised even in the early stages of silicosis. The Weltmann reaction was variable; the Takada-Dohmoto reaction was strongest in the uncomplicated cases and diminished with tuberculous infection, and the Mátéfy reaction tended to reflect the severity of the disease.

L. P. R. Fourman.


Hematological studies were made on 65 mine workers. [The type of mine is not stated.] Nineteen of these workers were judged to have either tuberculosis or non-specific infection, because they had either tubercle bacilli in the sputum, fever, hemoptysis, night sweats, or a radiographic picture which showed mottling with lack of uniform density or with hazy borders. Ten showed linear fibrosis, 24 small nodules less than 1 mm. in size, 20 larger nodules, and 11 larger nodules and conglomerate masses. Full blood counts and estimations of mean corpuscular volume, mean corpuscular hemoglobin, hematocrit value, and blood sedimentation rate were carried out. The statistical analysis for the whole group, including those with and without infection, showed a rise in the number of young polymorphonuclear leucocytes (mean figures were: in silicosis 422, in silicosis with infection 820, and in controls 206 per c.m.m.) a rise in mean corpuscular hemoglobin (silicosis 31-6, silicosis with infection 31, controls 29-6); and an increased (Wintrobe) blood sedimentation rate (silicosis 19-2, silicosis with infection 18-5, controls 7-7). These data suggest that neither an abnormally increased sedimentation rate nor a shift to the left of the polymorphonuclear leucocytes in silicosis necessarily indicates that pulmonary infection is present as a complication of the fibrotic condition of the lungs.

K. M. A. Perry.


The authors examined 150 silicotic subjects divided into four groups. Chest radiographs of the first group showed reticulation, of the second, silicotic nodules, of the third, confluent masses, and of the fourth, silicotic-tuberculous lesions. In 75 the electrocardiogram was normal, 44 having a mixed type. Ten had right and 21 left preponderance, a slightly greater proportion with right preponderance than are given in Benedetti's classification. This was most marked in the advanced types of silicosis, and the possibility of assessing disability by using such tests is considered.

G. C. Fether.


Since 1943 the authors have studied the conditions at a factory for manufacturing asbestos material, where 200 workers are employed, of whom 120 are exposed to asbestos dust. The raw material is usually imported from Canada, but for a period early in 1945 waste asbestos was used. Analyses of the air in the various departments when waste was used as the raw material showed free silica varying from 2 to 14-6% of the atmospheric dust; the weight of this dust varied in different sites from 74 to 6 mg. per cubic metre, and most of the particles were large. Later, when imported mineral was available, the total weight of dust fell considerably (11 to 6 mg. per cubic metre) and there was no free silica; the number of particles was now approximately 5 million per litre of air, and 90% of these particles were not larger than 1µ.

The workers frequently complained of marked symptoms long before the appearance of physical signs in the chest or radiological evidence of disease. The commonest symptom was cough. A dry cough during working hours occurred early in employment but tended to disappear after a few months, to be replaced by a persistent cough at night and in the early morning with slowly increasing sputum, which at first was clear but later became white and resembled semolina. Dyspnoea on effort was at first slight but became increasingly severe and was eventually accompanied by thoracic pain. Asbestosis bodies appeared in the sputum within 3 months after exposure and persisted for a long time after exposure had ceased (15 years in one case). They were found in all those exposed to dust; in those who had actual pulmonary asbestosis they were very numerous and were arranged more or less radially in clumps. Cases with complications seen in 4 years were 1 possible case of carcinoma of the bronchus and 3 cases of rapidly developing pulmonary tuberculosis. Acute bronchitis was common. The authors say that rheumatoid arthritis occurred frequently; they appear to believe that it was in some way causally related to asbestos dust. Brief accounts are given of six cases of certain or suspected asbestosis.

The authors consider that a diagnosis of pulmonary asbestosis can be made-on the symptoms and the presence of massed asbestosis bodies in the sputum even when the radiological signs are doubtful; the functional symptoms must, however, be dealt with. Asbestosis bodies and radiological signs develop slowly it is usually difficult to decide when a change of employment is desirable. The respiratory functions should be accurately recorded before the beginning of employment and at yearly intervals thereafter.

H. E. Harding.


Since 1942 a number of persons engaged in the manufacture of corundum were found to be suffering from lung disease presenting unusual features. In the manufacturing process, previously thought to be innocuous, bauxite is ground up and then mixed intimately with iron ore. The mixture is shoveled into large metal pots arranged in a row along the furnace rooms. Large carbon electrodes are lowered to the surface of the mixture, and it is fused at a temperature of about 2000° C. Dense white fumes, containing alumina and silica, are evolved, and considerable quantities escape into the atmosphere surrounding the furnaces where the workers...
are stationed. Data were obtained for 344 men working at the furnaces in four plants; radiographic changes were well established in 23, while in 12 they were "early" and in 13 "doubtful."

"The symptoms corresponded to the degree of lung involvement indicated by the radiographs. The disease is essentially an interstitial lung fibrosis, non-nodular in type. Dyspnea was the outstanding symptom, and sudden attacks of extreme breathlessness were often observed. Men with advanced disease complained of substernal discomfort and actual pain. Loss of appetite, weakness, fatigue, sleeplessness, and often marked cyanosis were associated with advancing dyspnea, while chest expansion was limited. In well-established cases the radiographs generally showed a widening of the mediastinal shadow and irregularity of the diaphragm. The lung fields were lace-like or granular in appearance, but these features were lost in more advanced cases. Seven of the men died after 2½ to 5 years' exposure, and material was obtained from 4 necropsies. Microscopical examination of the lungs revealed profound emphysema accompanied by an overwhelming invading fibrosis. Emphysematous blebs and bullae occurred in the visceral pleura and were apt to rupture spontaneously, giving rise to pneumothoraces. The walls of the arteries, more particularly the inner coats, were thickened. The enlarged alveolar spaces were enclosed by septa lined by swollen cuboidal cells, and fibrous tissue invaded many of the thickened septal walls. Much pigment was present, especially in heavily fibrosed areas. In no case was there any suggestion of tuberculous involvement. Three specimens of the lung were ashed, and the ash formed 5.9 to 9.7% of the dry weight of the lung. It contained 25 to 30% of silica and 32 to 45% of alumina.

H. M. Vernon.


In the study of the action of inhaled cadmium oxide dust on the lungs, information is required about the size and distribution of the particles. A method is described which allows direct microscopic observation of the particles in sections of the lung tissue taken 40 to 50 minutes after the death of the animals exposed. The rats employed were subjected to fumes of cadmium oxide from a direct current arc between cadmium electrodes. Immediately after the animals died the lungs were frozen in carbon-dioxide snow, and sections were made with a freezing microtome. They were placed on microscope slides suspended in a closed desiccator-like chamber containing solid oxide (the vapour of sublimed 8-hydroxyquinoline). Cadmium 8-hydroxyquinolinate di-hydrate is formed; after a drop of water and a coverslip had been placed on the tissue the sections were examined and photographed immediately under ultraviolet light and visible light. The ultraviolet light source was a carbon arc lamp, and the visible infra-red rays were removed by a Corning ultraviolet filter and a 2% solution of copper sulphate. The cadmium compound mentioned showed a brilliant green fluorescence, and all the cadmium oxide dust, down to particles of the smallest size resolvable by the microscope, becomes visible against the duller purple background of the tissue. Reproductions are given of the corresponding ultraviolet and visible light photographs.

H. M. Vernon.


The author refers to the work of Didonna on pneumoconiosis in which it is stated that the shape and size of dust aggregations are influenced, among other things, by the state of humidity and ionization of the air and by the rate of air movement. In considering the aetiology and the prevention of dust diseases in the milling industry, it is necessary to keep these facts in mind. The humidity of the air in the mills examined varied from 49 to 84% these figures being rather higher than comparable ones obtained in America or northern Europe. The dust particles examined by the author varied in size, between 0.85 and 1.7 µ, and were able to cause pathological changes. The silica content of the dust particles varied from 20.5 to 0.0013% of the ash. Many dust particles contained no starch.

There is a high incidence of respiratory disorders in four works. The author examined 176 workers from four different Italian mills: 56% complained of cough and 79% expectorated in the mornings. It was not possible to obtain enough films to radiograph all who had symptoms, but in 5 patients lung changes suggesting pneumoconiosis in the first or second stage were noted. Only in 1 case was associated tuberculosis discovered.

G. C. Pether.

INDUSTRIAL DERMATITIS


The authors describe the case of a healthy woman of 59 who for 2 years had been subject to increasingly severe attacks of acute erythematous dermatitis of the face, eyelids, and neck, which always recovered spontaneously in about 5 days. The attacks were observed to follow visits to her place of employment where the smell of burnt gas was often remarked. The products of incomplete combustion of gas may include carbon monoxide, aldehydes, acetylene, and hydrogen, with small quantities of sulphur and nitrogen oxides.

The following were the tests performed and the results obtained:

1. Exposure for half an hour in front of a coal fire. Negative.
2. Exposure for half an hour in a room previously filled with coal-gas (unburnt). Gas jets set low during exposure. Negative.
4. Exposure to gas fire (lit) with poor draught for 45 minutes. Positive.
5. Exposure to gas fire (lit) with efficient draught for 45 minutes. Negative.
7. Exposure for half an hour in a room where sulphur was burning, producing a high concentration of sulphur dioxide. Negative.
8. Patch-test with formaldehyde 0.5% in water. Positive — erythema and scaling of skin.

The positive reaction to 0.5% formalin suggests that minute traces of aldehydes produced by burnt coal-gas may have been the responsible irritant.

G. B. Dowling.
During 1944 and 1945, 235 employees were referred from an aircraft factory to the skin department of the University of Maryland as having occupational dermatitis. Of these, 56-6% were non-occupational; 34.4% were considered to have occupational dermatitis, while 9% had contact dermatitis of undetermined origin. Primary irritants were the cause of the eruption in 44% of the 81 patients with occupational dermatitis, while contact dermatitis was the cause in 30%, 20 cases being due to chromates, 2 to glue, and 2 to plastics. Injuries associated with dermatitis accounted for 17.3%, while treatment had caused 8.3%.

Dermatitis from contact with chromates had a typical clinical picture. It consisted of an acute, weeping crust that developed on the exposed parts, often occurring as dry, scaly, hard fragments of metal. The emphysema was confined within the anatomical boundaries of the middle palmar space. The patient recovered in six days with rest and chemotherapy. These pumps are similar to those used in garments to pump tires. Directed on to unbroken skin they are harmless, but they may cause emphysema if the pump is pointed on to any abrasion of the skin, however minute. Most patients recover uneventfully, the only danger being from infection. Men using such pumps should be warned of the possible danger of directing the stream of air on to any cut or abrasion.


In the two methods of spot welding, one by a stationary machine and the other by a mobile gun, intense sparking may at times occur, with the result that fine metal particles may become embedded in the worker's hands unless they are suitably protected. Twelve such cases are described in detail and their treatment is given. The lesions consist of superficial burns, minute entrance wounds, and underlying foreign bodies. The particles are sterile, but bacteria may be driven in with the fragments of metal, or secondary infection may later occur around the particles. It is suggested that if the patient is seen within 12 hours of injury the fragments should be removed and the wounds sutured. In later cases surgery is indicated only in the presence of infection or if there is pain. The most satisfactory protection is afforded by special cotton gloves coated with "neoprene," or asbestos finger-stalls worn under the usual cotton gloves. Leather gloves are useless. The ideal protective, however, has yet to be found.

K. M. A. Perry.

ACCIDENTS AND ORTHOPÆDIC SURGERY


A case of surgical emphysema of the hand following the use of an air-compressor pump is described. The pump was directed on to the hand in an endeavour to remove a fragment of metal. The emphysema was confined within the anatomical boundaries of the middle palmar space. The patient recovered in six days with rest and chemotherapy. These pumps are similar to those used in garments to pump tires. Directed on to unbroken skin they are harmless, but they may cause emphysema if the pump is pointed on to any abrasion of the skin, however minute. Most patients recover uneventfully, the only danger being from infection. Men using such pumps should be warned of the possible danger of directing the stream of air on to any cut or abrasion.

E. C. B. Butler.


The authors describe 4 accidents of which 2 were fatal. The victims were in contact with currents of 45,000 to 50,000 volts, and it was observed that the damage to striped muscle was extensive and severe. Such damage has not previously been stressed, and yet it may have great prognostic significance. Such muscle damage depends on the high voltage and amperage of the current; it is only when such conditions obtain that the injuries described can occur in a short period of time. Since striped muscle provides an easy path for the passage of a current the local heating effect is great. From the pathological findings it appears that some degree of coagulation occurs so that the terminal renal damage, so often seen after electrical injuries, has not so close a relation to superficial burning as was supposed.

In one case an engineer was struck by a flash from a cable carrying 45,000 volts, the spark jumping about 5 cm. He fell backwards and the period of contact did not exceed 2 seconds. He had been sweating heavily when injured so that the skin resistance was low. His body received about 450 kW and the equivalent heating effect would be as much as a 1,000 W electric oven yields in 15 minutes. As the superficial injuries were slight a good prognosis was given when the patient recovered consciousness, but two days after the accident he died of renal complications and anuria. Extensive muscle injuries were found in the legs and the right arm. The urine became progressively more discoloured from the second day and contained a red pigment, probably myoglobin. The heart showed no appreciable damage and its rhythm was not apparently disturbed.

LUMBAR PUNCTURE IN THERMAL INJURIES OF THE SKULL

Lumbar puncture in thermal injuries of the skull is advisable only if there is an increase in production of cerebrospinal fluid; it is contraindicated if there is cerebral oedema.

H. Jaslowitz.
ABSTRACTS

The authors suggest that myoglobin probably entered the circulation a few minutes after the accident and that renal injury increased rapidly from that time. Remedial measures should include the immediate administration of alkalis and saline infusions. If there is no diuresis after 12 hours of alkali therapy the dose should be reduced. Citrate should not be given, since it fixes calcium. If potassium poisoning is feared, calcium should be administered intravenously as the gluconate. Absolute rest is essential. Plasma may be given later and isotonic saline and glucose per rectum or by other suitable route. If there is still some chance of survival amputation of a badly injured limb may save life.

G. C. Pether.

ENVIRONMENT


Electrostatic precipitation of dusts was first used to recover waste materials, and was only later employed as a hygienic precaution. It is particularly applicable to the very fine, and thus the most dangerous, dusts.

The method is of great value in sulphuric acid plants where it is used to separate arsenical vapours. It is also employed in coke ovens and in many industrial enterprises in which valuable or dangerous products occur in a fine state of division. From the commercial aspect it has to be considered as in competition with methods of sedimentation, centrifugation, mechanical filtration or pulverization in the presence of a liquid. Whereas a centrifuge may give a yield of 50% and filtration about 90%, the electrostatic method is from 90 to 100% efficient.

The cost is moderate. As a method of removing harmful products, as laid down in industrial legislation, it has many advantages.

G. C. Pether.


The limiting levels of temperature and humidity, which define a “heat death line,” are shown to impose the same heat stress on the body whether in the jungle or the desert. The “heat death line” also permits prediction of a heavy incidence of heat prostration and non-fatal heat stroke among healthy but poorly acclimatized young men, wearing the army summer uniform, who work for several hours in the sun. Heat deaths are found to be caused by the heat load, as determined by climate, activity, and body build, considered in combination as components of the total heat stress.

According to present data “rapid acclimatization” for 1 week or 10 days cannot be expected to confer complete immunity to heat injury on men working in the sun, when weather conditions exceed those of the “heat death line.” In one-third of the fatal cases the subjects had spent 1 month or less in the heat before death occurred; there were as many deaths after 4 weeks’ exposure as after exposure for 1 week. Incidence fell rapidly with longer acclimatization, the curve of the number of deaths becoming nearly asymptotic at the end of 2 months.

Susceptibility to heat stroke is especially high in persons acclimatized to an atmospheric cooling power above a certain level (about 600 calories per square metre of body surface per hour) when they are exposed to an atmospheric cooling power below this level. Three cooling power zones are shown on a map of the U.S.A.

In the most northerly the heat stress seems to be insufficient to confer acclimatization to work in the sun when conditions are more severe than those of the “heat death line.” Persons living in this zone are particularly susceptible to heat injury during unusual heat waves or excursions to hotter climates. In the central and southern zones, casualty-producing conditions may be expected normally. Most fatalities associated with heavy exercise occur at relatively low temperatures, when the total heat stress is commonly underestimated.

D. T. Barry.


To ascertain the effects of various kinds of clothing designed for work in warm and humid atmospheres 3 men performed mechanical work in an air-conditioned room at 85° F. and with a relative humidity of 85%. The air movement, recorded by a thermo-anemometer attached to the workers, was 70 feet (21 m.) per minute. The men stepped up and down a two-step platform eight times a minute, and this required a total body energy expenditure of 255 cal. per hour. All the subjects preferred to work unclothed, and they then secreted an average of 521 g. of sweat in 2 hours. When wearing loose-fitting pyjamas weighing 320 g. they secreted 610 g. of sweat, and with a close-fitting cotton union suit (480 g.) they secreted 694 g. When wearing a two-piece jungle suit consisting of 3 oz. (141-7 g.) of densely woven poplin and heavy boots (weighing 950 g. altogether), they secreted 756 g. of sweat when the trouser legs and jacket collar were open, and 984 g. when they were closed. The closed jungle suit and the close-fitting cotton suit were particularly disliked because they became damp and sticky. The rise in body temperature and pulse rate were little affected by clothing, but the rate of sweat secretion closely followed the degree of heat discomfort experienced.

H. M. Vernon.

GENERAL


Drosophila melanogaster was used in the authors’ experiments. It was found that anaesthetizing the flies for convenience of handling did not affect observed mortality. The flies were exposed to contact with insecticides by placing them in vials lined with filter paper previously impregnated with the solution to be tested, or else by placing them in vials the inner surface of which had been directly coated with the chemical. Both techniques gave satisfactory results. With the impregnated paper technique a drop in mortality was observed when the dosages was increased from 3 to 10 mg. of D.D.T. per 10 ml. of acetone; this greater lethal power of the weaker concentration was confirmed on repetition. The authors found no satisfactory explanation for this curious phenomenon, but suggest the possibility that solutions of different concentrations deposit crystals of different sizes and that this affects mortality.

Up to the present no law is known which relates the insecticidal activity of organic molecules to their chemical structure; the problem can only be solved as the results of a vast number of comparative tests become available. The authors of the present paper set out the results of
their experiments, and put forward the following "tentative ideas" on the relation between contact insecticidal action and the structure of the organic molecule in insecticides tested against adult D. melanogaster.

(a) Removal of the chlorine from one phenyl group reduced the effectiveness of D.D.T. to 1/90, but removal of the chlorine from both phenyl groups resulted in a totally inactive compound. (b) Alterations of the p, p' arrangement of the chlorine atoms on the phenyl groups, as in o, p', D.D.T. reduced the toxicity to 1/145. (c) Replacement of the two chlorine atoms on the phenyl groups by other halogens shows the order of toxicity of these substitutions to be—fluorine, chlorine, bromine, iodine, but the more highly toxic fluorine analogue unfortunately loses toxicity rapidly on exposure. (d) Replacement of the p-substituted chlorines on the phenyl groups by groups other than halogens as far as the tests described here are concerned resulted in greatly lowered toxicities. However, Busvine and Barnes have both found the methoxy analogue of D.D.T. almost as toxic as D.D.T., seeming to indicate that the toxicity of such substitutions may depend entirely on the radicles substituted. (e) Unsaturated bonds appear to reduce the toxicity markedly. (f) Removal of the trihalogen group in so far as it was here attempted resulted in considerable reduction of activity on slight alteration to complete inactivity with complete removal or substitution.

R. M. Gordon.


Experiments were carried out in Kenya in which tents, huts, and wooden traps, all containing human "bait," were used. Impregnations of 50, 100, and 200 mg. per sq. ft. of D.D.T. in kerosene were carried out with a power sprayer. An "annexe" tent was attached to the end of the first to ascertain the extent to which mosquitoes left a treated tent.

There is no interference with the normal behaviour of Anopheles gambiae and, for the most part, entry into the huts and tents and biting of the occupants are concerned. When, however, the mosquitoes have been affected by contact with D.D.T. they tend to leave the building concerned. It is concluded that "reduction in malaria transmission will not be achieved by mosquito mortality; however great, in a single impregnated building...similar treatment must be given to all human habitations in the neighbourhood, probably up to a radius at least as great as that found necessary in larval control of the anopheline species concerned."

R. M. Gordon.


In trials in native dwelling-houses in Gold Coast Colony a 1 per cent. solution of D.D.T. in kerosene produced relative absence of mosquitoes in the rooms treated. Nine weeks after a single spraying the proportion between mosquitoes infesting the D.D.T. and control rooms had risen gradually to only 4 : 10. When the dosage was reduced to 11-9 mg. D.D.T. per sq. ft. the proportion 4 : 10 was reached in 13 days and complete parity with the control result ensued in 28.

In a trial under semi-rural conditions in a non-malaria controlled area and using a dosage of 19-75 mg. D.D.T. per sq. ft. it was found that, despite its gradual increase, the D.D.T. index factor had still to attain to its initial level at the end of 9 months from the original date of spraying.

After adoption of the residual D.D.T. method as a routine and using a dosage of 19-3 mg. per sq. ft., sustained reductions in mosquito numbers were obtained over intervals of up to 18 weeks from re-spraying. The normal direct relationship ceased between rainfall and all species of mosquitoes collected, as also between rainfall and collected anopheline mosquitoes.

From the Author's summary.


The feron-propelled "aerosol" bomb depends, for the rapidity of its action, on the presence of pyrethrins. The high cost and the difficulty of obtaining pyrethrins render the use of adjuvants desirable. Piperonyl butoxide contains 80% of (3,4-methylene-dioxy-6-propyl-benzyl)-(butyl)-diethylene-glycol ether. It is a colourless liquid, soluble in all common organic solvents, and, like pyrethrins, is non-toxic to warm-blooded animals. The results of tests according to the Peet-Grady procedure suggest that the addition of this adjuvant may allow pyrethrins to be efficiently used in "aerosol" bombs in a lower dilution, and, therefore, much more economically than was previously possible.

R. M. Gordon.


This paper appeared at the same time as the one by Wachs (see above abstract). The author confirms Wachs's findings regarding the efficiency of piperonyl butoxide as an insecticide when used as an adjuvant to pyrethrins, and its freedom from toxicity to warm-blooded animals. The most efficient proportion in a spray was found to be 1 part of pyrethrins to 8 parts of piperonyl butoxide, when tested by both authors according to the Peet-Grady procedure. Whereas Wachs tested only the immediate action of the insecticide in a base oil against house-flies, Dove extended his observations to other methods used against various arthropods and in certain instances observed the residual action of the insecticide.

R. M. Gordon.


This is a report of studies carried out by the Foreign Quarantine Division of the United States Public Health Service. The "1080" compound is a powder. It may be used in a water solution or with bait; both methods are described, the former being preferred. In this study, covering 1 year, 96 vessels were treated with 1080; 1,262 of 1,475 rats (85-5%) died. Hydrocyanic acid gas killed 99-2% of rats. The 1080 investigations are being continued.

Advantages of 1080 are its ease of employment; its quick action; ease of recovery of rat corpses; and the apparently insignificant degree of tolerance developed by rats which may ingest sublethal quantities. Dis-advantages are that in many instances only a partial kill of rats was obtained during the first day, and that the aqueous solution freezes when exposed to low temperatures. The substance is very poisonous to other animals and presumably to man; it offers a hazard to animals not only directly but indirectly if they swallow...
ABSTRACTS

1080-poisoned rats. The high absorption rate of 1080 by the gastro-intestinal tract makes treatment for poisoning difficult. Highly soluble in water, it may be washed out of baits by rain or other water, and might cause contamination of food or other supplies. It is a white powder which can be mistaken for flour, baking powder, or similar food products.

[For practical purposes fumigation by hydrocyanic acid is immeasurably superior to this new method.]

J. Greenwood Wilson.

Vaccination of Industrial Workers Against Smallpox.


Between 1942 and 1945 50,245 workers in several plants were vaccinated against smallpox. Because of reaction to the vaccine 1-2% lost time from work. The average worker so affected lost 2-43 days. There were no cases of encephalitis, myelitis, tetanus, generalized vaccinia, eczema, or other widespread skin diseases. Malaise, low-grade fever, pain, swelling, and redness of the arm at the site of vaccination accounted for most absences. Cellulitis of the arm with axillary adenopathy occasionally caused an absence of more than 3 days. Workers over 60 who had not previously been vaccinated had an appreciably higher disability rate than did young workers. In one factory 7 out of 54 such men lost 21 days.

K. M. A. Perry.

Acute Infections of the Respiratory Tract and Their Control in Industry. With Special Reference to Immunization Against Influenza.


Respiratory infections arise from persons who carry the infective agent in nose and throat. Individuals might be educated not to spread infection by coughing and sneezing. Industrial undertakings might supply paper handkerchiefs and ask employees to use them and then place them in appropriate receptacles. To prevent droplet infection workers should be spaced at least 5 ft. apart. Dust-suppressive measures lead to reduction in streptococcal infections of the respiratory tract. Since ultra-violet irradiation can be used only in the upper air of the room and does not reach the droplets, it is of little value in industry. Aerosols are not effective at high temperatures or when humidity is high, their toxicity is not fully worked out, and they do not inactivate organisms in dust or in the larger droplets. Proper sanitation in preparing and serving food is important.

Influenza virus A and B vaccine will reduce the incidence of these diseases during an epidemic. The duration of the immunity has not yet been determined, and it would seem better not to urge vaccination in anticipation of an epidemic, even though it might slightly reduce the annual rate of disease. The continuous administration of sulphasulphate for prophylactic purposes may lead to development of drug-resistant strains. Experiments have shown that neither irradiation of workers with ultra-violet light nor the addition of vitamins to their ordinary diet will increase their resistance to infections of the respiratory tract. Chilling, inclement weather, or a fall in outdoor temperature lowers the resistance of some persons to respiratory tract infections.

K. M. A. Perry.

The Protective Effect of Vaccination against Epidemic Influenza B in an Industrial Plant.


Encouraging results were obtained during the winter of 1944 by members of the Special Influenza Commission of the Preventive Medicine Section U. S. Army, through subcutaneous vaccination with influenza virus vaccine against influenza, primarily of type A. In November, 1945, it was decided to vaccinate with vaccine produced for the Influenza Commission several hundred employees in a war industry against a threatened epidemic of influenza. The purpose of the report is to compare the incidence of the disease and the time lost in the vaccinated group with these factors in the unvaccinated group during the ensuing epidemic of influenza B.

Two types of influenza virus, A and B, are at present identified, but most workers agree that these cannot be differentiated clinically. In 1941 Hirst introduced a simple test for detecting influenza antibodies. The test depends on the fact that red cells of certain fowls and mammals are agglutinated by both influenza A and B viruses, and that convalescent human sera specially inhibit this agglutination. Recognition of the disease and type depends upon demonstrating a marked increase in specific antibodies in the patient's blood during the time between the acute phase of the disease and the convalescent stage. In the 1945 experiment blood from 13 suspected cases of influenza was tested by a modification of the Hirst technique; in of the 13 the agglutination tests were positive for type B influenza. Other sources indicated that the disease reached epidemic proportions in the U.S.A. in November and December of that year.

At an industrial plant 366 employees out of 4,464 were given subcutaneous inoculations of 1 ml. of inactivated influenza virus (types A and B) at the beginning of the influenza epidemic. Instances of reactions sufficiently severe and prolonged to cause loss of time from work were rare. Thirteen of the 366 persons vaccinated (3-55%) developed influenza B during the following 8 weeks; 6 of these developed the disease during the week following vaccination. The incidence in the group vaccinated in time for antibody response was 1 95%. In the comparable group of 4,280 unvaccinated employees, 352 developed influenza, giving an incidence of 8 23%. The incidence was 4 25 times as great in the unvaccinated group as in the group vaccinated early enough for good protection. Loss of time due to sickness was 4 4 times as great in the unvaccinated group as in the group vaccinated early enough for antibody response to occur.

A. J. Amor.

Coalminers.


Between the wars of 1914-8 and 1939-45 there were 150,000 to 200,000 unemployed miners in Britain; now there is a shortage of miners. Between 1921 and the slump in 1931 the industry was contracting, and closure of pits led to great hardships. In 20 years the total number of miners has fallen from 1,250,000 to 700,000. Compared with other workers, coalminers have unsatisfactory sickness records. There is a high incidence of psychological disorders among them. Death rates calculated for causes other than accidents between 1910 and 1923 show the unsatisfactory trend of mortality in young miners. The low death rates recorded in the 19th century are probably due to selection of the most robust children to carry on the tradition of mining families. Departure from this practice and emigration of the healthier men may have caused these regressive mortality trends between the wars. The fall in the birth rate in
mining communities was greater by one-third than the natural average, in spite of high "fertility" figures in earlier decades. The mortality among miners' infants and wives was about one-third higher than the average.

After 1939 conditions were transformed, and by 1945 miners' wages were doubled; training and welfare services were provided and unemployment ceased by 1941; yet there have been strikes and absenteeism, Juvenile recruitment fell and man-power was only maintained by the direction of workers. Previously medical, hospital, and occupational health services were inadequate, but recent legislation should bring changes. Research is needed on nutritional needs for full output, on hours, fatigue and absenteeism, and on the claim that a miner is past his best at 35. Pneumoconiosis is now receiving proper attention, but more research needs to be directed to the "beat" diseases, which should not have proved so refractory, to fibrosis, and to dermatitis, which has lately increased sevenfold. Nystagmus and the psychological effects of new mining methods require more investigation. Knowledge of accident-proneness should at once be applied. A State industrial health service for South Wales miners is advocated, to be concerned with "placement," environmental hygiene, accident prevention, periodic examinations of workers, and follow-up of those disabled. Though rehabilitation is already organized, resettlement lags behind. A school of mining medicine is suggested.

J. N. Agate.


Annual deaths from cancer of the skin, excluding penis and scrotum, are approximately 1,000 per annum in England and Wales, and the mortality in males is about 70 per cent. higher than in females. The mortality for males and females from cutaneous cancer is greater in Ireland than in England and Wales, whereas the Scottish male experience is more favourable. The face is the principal site involved, the ear next. The mortality has a gradient with social grouping for the wives of workers, but for males it would seem to have both a social and an occupational relationship, the latter seemingly the more important. These findings, and the anatomical character of some of the sites affected, suggest that atmospheric soot or grime (as in scrotal cancer) may be an aetiological factor. Ultra-violet radiation from the sun may be responsible for skin cancers in exposed sites. Heat, or heat plus grime, may be operative in such occupations as that of furnace-men. Classification according to site in official returns is needed to increase the value of correlations with occupational or other social factors. Correlation with geography or hours of sunlight should also have value.

From the Author's summary.

ASSOCIATION OF INDUSTRIAL MEDICAL OFFICERS

NOTTINGHAM GROUP

A Meeting of the Group was held on Thursday, Oct. 16, 1947. Dr. G. Collis was in the chair, and 11 members were present. The Hon. Secretary read a letter from Dr. Pringle regarding the exemption of full-time industrial medical officers from Part I of, and the course for, the D.I.H. He also read a letter from Mr. J. W. Whitfield giving an outline of the proposed course on statistics to be given to members of the group. After considerable discussion a vote was taken and the majority decided not to proceed with the proposed course at present.

After the meeting, a dinner was held at which D. S. A. E. Jessop was a guest. Mr. Jessop opened a discussion on "Thoughts on the function of the I.M.O. in the future," deploring the present tendency of many medical officers to concentrate on the day-to-day routine work, and pointing out the great scope for research into industrial health that is available in the factory and shop. He also thought that, speaking in the widest sense, the Medical Officer could and should play an important part in the advancing and improving industrial relations. An interesting debate followed at which many different points of view were expressed.