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In almost all can manufacturing plants there is a bodymaking machine in which the side seam of the can is soldered. After the can has been formed, it passes over a solder bath about four feet long. The solder is applied by a roller, following which the soldered seam is heated by a burner. The cans then pass over a cloth wiping wheel which removes the excess of solder, and a blast of air is applied for cooling. The solder consists of 98 per cent. lead and 2 per cent. tin, and in order to investigate the amount of lead fume passing into the air at various points, a can line isolated from other can lines was studied. Samples of air were collected at the breathing zones by M. A. Electrostatic Precipitator, and analysed for lead by the dithizone method. The data obtained showed that contamination of the air from the (well ventilated) solder bath is of minor importance compared with that from the burner, wiper and cooling blower; e.g. 10 cubic metres of air from these latter sources might contain 28-49 mg. of lead, as compared with 0-3-4-5 mg. from the former. When the wiping wheel was enclosed and ventilated by an exhaust, the air at all the points tested contained only 0-4-1-1 mg. of lead, or less than the permissible maximum of 1-5 mg. Samples of air taken at the same time form a room adjacent to the test room contained 2-9 mg. of lead.

H. M. Vernon.


A group of 71 individuals working with explosives containing ammonium picrate were kept under observation for 1-15 months. The 'milling' and 'preforming' groups were exposed to the greatest amount of picrate dust, and the picrate collected on the filter paper inserts in the respirators of two workers during a 6-hour milling operation yielded 52 and 156 mg. of picrate respectively. Seven of the workers developed dermatitis which was thought to be due to the picrate, but this may not have been the sole agent responsible because other components were occasionally present. The cutaneous lesions appeared usually on the dorsum of the hands, on the anterior surface of the forearms, and at the end of the elbows. They consisted mostly of erythematous patches containing papules and vesicles. Five of the seven individuals were able to return to work without developing further lesions, but they were urged to wear rubber gloves. The data obtained seemed to show that the persons least exposed were the most likely to develop dermatitis, and it was concluded that the picrate does not act as a primary irritant, but that sensitization to it may develop. The workers did not show systemic poisoning, but there was some staining of skin and hair.

When rabbits and guinea-pigs were kept for periods up to 12 months in the buildings where milling and preforming were carried on, over half of them died, and brown granular deposits, presumably picrate, were found in lungs, liver, heart muscle and kidney.

H. M. Vernon.


Fujiiwara discovered that when sodium hydroxide and chloroform are heated together, a red colour develops. The test is not specific for chloroform and has been used for the colourimetric determination of various chlorinated hydrocarbons. In the present investigation the influence of several factors on the estimation of carbon tetra-chloride has been studied, and it was found that the test allowed the detection of the tetrachloride in concentrations as low as 2 µg per ml. when it was dissolved in acetone. Also chloroform and carbon tetra-chloride in a mixture of 1:3 µg per ml. could be detected when dioxane was used as a solvent. Employing a fixed concentration of sodium hydroxide and using acetone as a solvent, the minimum detectable amount of a number of organic halides was estimated. Also the optimum concentration of sodium hydroxide for maximum colour production was investigated.

H. M. Vernon.


The pathological effects of the inhalation of antimony trioxide were studied in guinea-pigs. The animals were at first exposed in the experimental chamber for 2 hours daily, and after 3 weeks, for 3 hours daily. The average dust concentration in the chamber was 45 mg. of antimony trioxide per cubic metre of air, as determined gravimetrically by means of an electrostatic precipitator. It was computed that the guinea-pigs retained 1-6 mg. of trioxide daily, and that the 24 guinea-pigs were inhaling from 13 to 424 mg. All the animals showed extensive pneumonia, and 11 out of the 15 animals inhaling 77 mg. or more of the trioxide showed fatty degeneration of the liver. The white cells of the blood increased, and so did the polymorphonuclear leucocytes and eosinophiles, but the lymphocytes showed a relative increase. No pathological changes were demonstrable in the heart or kidneys.

H. M. Vernon.


Balme opened the discussion by saying that the Disabled Persons (Employment) Act has not yet received the attention which it merits from the medical profession who, with the hospital services, will be so directly involved.

In general terms, the purposes of the Act may be summarized as follows: First, it establishes the important principle that disability of any shape or form—whether congenital or acquired, medical or surgical, general or local—constitutes a claim upon the State for assistance, and that such assistance should not merely be expressed in terms of financial allowances or pensions, but rather in measures calculated to restore physical functions, wherever possible, and reinstate the disabled person in some suitable form of gainful occupation. Secondly, it makes provision for the vocational training and industrial resettlement of those who, subsequent to hospital treatment for injury or sickness, need to learn a new profession, trade or occupation before being fit to resume employment. Thirdly, it assists disabled persons to secure work by means of a requirement on employers to engage a stated proportion of men or women so handicapped. Fourthly, it provided employment under sheltered conditions of those who are severely disabled, but are able to do regular paid work, provided that they do not have to stand up to the working conditions of competitive employment.
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A register is to be compiled of all persons substantially handicapped by reason of disability, and this will not only be a record of disabled persons for whom suitable jobs must, if possible, be found, but will also be a register of the failure of our hospital services to prevent residual disability. The particular directions in which medical assistance is essential to the successful operation of this Act, may be summed up in the phrases: Prevention of residual disability; assessment of loss of functional capacity; and provision for cases of dependency. The public authorities are to have the responsibility of personnel management, under the present system, to provide a part in the supervision of the return to work of the sick or injured worker. The finding of light or alternative work is a matter of considerable difficulty, and often there is inadequate medical control. Medical supervision of return to work is of great importance and is a main reason for the extension of medical services to cover the whole of industry. The industrial medical officer should obtain accurate information of the incidence of sickness and accidents and of the progress of all sick and injured workers, and also compile an analysis of jobs and endeavour to establish special workshops in the factory. An account is given of a special rehabilitation shop set up in a large engineering works for injured employees who normally would not be at work, but would be undergoing treatment. During the 21 years of its existence the shop employed over 500 injured workers and excellent results were obtained.

Griffiths pointed out that no mention has been made as to what the Act would cost industry if rehabilitation is to be achieved, and some figures are included showing that millions of pounds would have to be found selected and unproductive jobs. The rehabilitation workshop has a greater educational than a curative value and the majority of cases will do better on alternative work. Agate said if between 1 and 2 million disabled persons are going to register, notice must be taken of the Ministry of Labour's own estimate that of these, 25 per cent. have surgical disabilities, 50 per cent. have disabilities, and 25 per cent. are neurotic. The medical and neurotic cases can only be improved a little by treatment, and the Disablment Rehabilitation Officers are failing to place such cases in any jobs. It is a pity that the selected dyspnoea on exertion is the main handicap and determines the kind of work a man can do. Cardiac cases prove hard to place. A comprehensive job analysis for all occupations in the country is needed, but a possible alternative is for the doctor who knows the case of a disabled man to prohibit specifically certain physical actions, such as lifting weights of more than 20 lb. The new Ministry Form 'D.P.1' has this as its basis and is very helpful.

Watson-Jones thought that in most cases the resettlement of disabled persons called for very skilled medical experience coupled with a knowledge of industry. Disablement Rehabilitation Officers should be directed by local medical boards and their activities co-ordinated by regional medical consultants. Doctors should so influence their patients that a complete record was available of every individual who might have difficulty in seeking or keeping employment.

If this was not done one of the greatest medical and social reforms of this generation would be imperilled.

A. Thelwall Jones.


In this paper the authors discuss defects of the isthmic zone of the lumbar vertebrae as a cause of backache. The isthmic zone is defined as that portion of a vertebra between the superior and inferior articular processes. This area is a narrowed bridge of bone and furnishes the only true bony support of the vertebral column. According to Chard, defects of the vertebral isthmus might result from faulty ossification, but Meyering favours injury at birth or trauma superimposed on a congenital lesion as being responsible for such defects. Clinically the condition presents as low back pain which
is aggravated by any strain on the back. There may be a previous history of trauma. Physical examination may not reveal any abnormality, but there may be muscle spasm, tenderness or limitation of movement. Diagnosis depends on the history and the x-ray examination of the chest. If there is no defect in the antero-posterior radiograph, but it is better seen in the lateral view and even more readily in the three-quarter oblique view. Numerous radiographs are reproduced in which the defects are magnified.

Conservative treatment of the defects consists in rest, support to the back and in physiotherapy to strengthen the muscles of the back. If this fails fusion of the vertebrae by bone grafts is advocated. Seven illustrative case histories are given.

W. S. Tegner.


The refractory brick industry in Kentucky consists of ten major plants with a total working population of about 2000. Two raw materials are used in the manufacture of fire brick: (1) raw plastic clay containing 18 per cent. of free silica, and (2) raw flint clay containing 7 per cent. of silica. Analyses of the dust encountered in the various industrial operations ranged from 1 per cent. of free silica in burnt brick dust to 95 per cent. in the mould or parting sand, and averaged 12 per cent. The most dangerous sources of sustained dust production are the dry pan mills, with an average dust count of 53 million particles. The average free silica concentration when grinding plastic clay was calculated to be 102 million particles, and 60 million when grinding the burnt clay. This could be greatly reduced by their complete enclosure. By enclosing the mill almost completely the average dust count was reduced from 108 to 10 million particles per cubic foot. The screen bottom of which levels is aggravated by any strain on the back. There may be a previous history of trauma. Physical examination may not reveal any abnormality, but there may be muscle spasm, tenderness or limitation of movement. Diagnosis depends on the history and the x-ray examination of the chest. If there is no defect in the antero-posterior radiograph, but it is better seen in the lateral view and even more readily in the three-quarter oblique view. Numerous radiographs are reproduced in which the defects are magnified.

Conservative treatment of the defects consists in rest, support to the back and in physiotherapy to strengthen the muscles of the back. If this fails fusion of the vertebrae by bone grafts is advocated. Seven illustrative case histories are given.

W. S. Tegner.


In order to determine the risk of silicosis to workers in the fire brick industry, x-ray exposures (17 x 14") were made on 87 per cent. of the men employed in seven major plants in Kentucky, or to 876 workers in all. On an average 11-9 per cent. of them showed pneumoconiosis, or from 6-5 to 18-8 per cent. in the individual plants. The fibrosis observed was uniform and finely granular, and seldom showed any tendency to form discrete nodules. The men had been employed in the industry for 9 to 47 years, or an average of 25 years. Two of the men—employed in dry pan mills—showed conglomerate silicosis, and 26 out of the 876 examined showed evidence of tuberculosis. The tuberculosis frequency was twice that found by the Tuberculosis Control Division of the State Board of Health during their routine mass surveys of the area.

H. M. Vernon.


Silicosis may be the earliest of occupational diseases. 5,000 B.C. Neolithic man sank shafts into the earth from the bottom of which levels were excavated for getting the best workable flints as in Grimes Graves in Norfolk. Catarhal infections such as chronic sinusitis, and repeated bronchial infections which temporarily or permanently destroy cilia predispose to silicosis. It is aggravated by any strain on the back. There may be a previous history of trauma. Physical examination may not reveal any abnormality, but there may be muscle spasm, tenderness or limitation of movement. Diagnosis depends on the history and the x-ray examination of the chest. If there is no defect in the antero-posterior radiograph, but it is better seen in the lateral view and even more readily in the three-quarter oblique view. Numerous radiographs are reproduced in which the defects are magnified.

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W. S. Tegner.


A short paper in which chronic fatigue is evaluated as a symptom in cases where organic disease is absent. Manual workers seldom complain of it. "Auto-intoxication" has been a popular explanation and has led to a spate of ingenious advertising. The psychosomatic approach might suggest that there is a relationship between the psychological accompaniments of fatigue and such a factor as hypoglycaemia. But the relationship is not exact. The professional classes often live irregularly and are out of training, expending too much energy on unprofitable mental activities, for which 'overwork' is later blamed. If work is congenial, there can hardly be an excess of it, and a complaint of overwork is not a cause but an indication of mental ill-health. Cabot's diagrams are shown, in which a properly balanced individual is compared with others in which there is imbalance from an excess of one or more of the four essentials, work, play, love and worship.

J. N. Agate.
and that in these cases histological as well as bacteriological evidence of tuberculosis has become obliterated. Pulmonary tuberculosis is the most important immediate cause of disability in silicosis; it is slowly progressive and does not respond well either to sanatorium treatment or to local therapy. Certain complications are a frequent complication and right sided cardiac failure is a common cause of death. It occurred in 26 out of the 116 cases, while there were clinical signs of decompensation in 16 cases, many of which were congestive encephalopathy, of the liver, and dependent oedema. Dyspnaea became aggravated by the onset of myocardial failure. X-ray demonstration of right ventricular enlargement is an important aid to diagnosis. The electrocardiogram showed right axis deviation. Other complications include fracture of ribs from muscular violence, enlarged lymph glands draining the lungs, chest wall abscess and obstructions of the biliary tract resulting from pressure on the common bile duct by enlarged silico-tuberculous lymph nodes.

K. M. A. Perry.

Pneumonoconiosis in Radiator and Boiler Finishers.


Of thirty radiator and boiler fettlers examined with X-rays ten showed undoubted evidence of changes attributable to their occupation. The castings were made in sand moulds with cores of sand and oil. They were cleaned with live brushes causing a cloud of fine dust. The radiological picture was that of the fine mottling in the middle and lower lung fields met with in pneumonoconiosis. The cases were short breath and two felt ill and unfit for work. The cause of the radiographic appearance is discussed. The dust inhaled contained iron, carbon and silica, but any conclusion as to which substance caused the mottling was considered unjustified. A plea is made for further investigation as to whether the lung shadows are due to actual dust deposits in the lung or to reaction of the lung tissue to the dust. If the cause of the shadows is due to silica the men are entitled to compensation.

M. H. Jupe.

Negative Chest Findings in a Mineral Wool Industry.


Mineral Wool is a fibrous glass-like material composed of calcium and aluminium silicates, and includes such materials as rock wool, slag wool and glass wool, of which the first two are discussed. None contains more than a trace of free silica but samples show from 29.5 to 51.5 per cent. of the total silica. Dust is discharged from 15 to 36 million particles per cubic foot, and 76 per cent. of the workers studied have had more than from 10 to 14 years’ exposure to it. The only constant X-ray findings were increased linear markings in 51 per cent. of the group, the majority being from 30 to 44 years old, but a control group had a similar incidence of increased linear markings. This paper does not bear out a suggestion that dust from mineral wool is potentially dangerous, though the exposure here would have been long enough to produce abnormal X-ray appearances.

J. N. Agate.

A Health Survey of Pipe Covering Operations in Constructing Naval Vessels.


The pipe coverers in two Government Navy Yards and two Navy Contract Yards were examined for the presence of asbestosis, incurred in their occupation. The pipe covering frequently employed was amosite, a maged of calcium and aluminium silicates, and included a range of materials, the main ones being iron and steel, a low thermal conductivity, light weight and refractoriness. Much asbestos cloth and asbestos cement were likewise used. Pipe covering may be divided into seven different operations, and dust counts showed that layout and cutting, band saw cutting, cement mixing and installation on board ship were usually the most dusty. Chest X-ray investigations were made on 1074 men in all, of whom only three showed signs of asbestosis. Each of the men affected had worked on asbestos pipe covering in shipyards for more than 20 years. It is recommended that the operations mentioned should be speeded up and exhaust ventilation in order to keep down the dust concentration.

H. M. Vernon.


The writer describes a disturbing increase in silicosis in Switzerland during recent years in consequence of which greater measures of protection are now introduced. Cases were first recorded in 1894 and in 1916 Staub published his case notes and induced employers to give greater protection and suitable compensation. This was the first legislation of its kind in Europe. Many suspected cases were later notified but in 1942-43 two-thirds of the cases suspected in miners could not be verified. It is pointed out that one must distinguish between mere anatomical change, physical signs and disturbance of function. The first may be present alone or in combination. Conversely, a miner may complain of sundry symptoms and believe his capacity to be much reduced from silicosis, yet careful examinations show no sign of this disease. Diagnosis must be based on radiography and on the history. Screening along with serial X-rays or serial photographs are needed. He describes three stages:

1. Minute shadows of pin-head size scattered in the middle zones with increased striaion and enlarged or accentuated hilar shadows.
2. Shadows up to the size of a pea which are so numerous as to give a granular or tapioca appearance.
3. Compact shadows, usually in the middle zones and perhaps spreading upwards, resembling growths and with atelectatic areas; signs of contraction, fibrosis and pleural thickening and adhesions.

The appearances described are not sufficient, by themselves, to permit a diagnosis of silicosis. One must also know the history. Many other conditions may be mistaken for silicosis. There is no typical relationship between the period of exposure and the extent of the X-ray changes. Clinical signs and symptoms seen in these cases include asthenia, prolonged expiration, cough and fremitus. In general, there is evidence of bronchitis. Fever is uncommon. Patients tire easily, lose weight and complain of much dyspnoea even after the slightest exertion. The X-ray appearances should make one suspect silicosis. Tests with the spirometer are valuable. Important evidence may be gained by exercising the patient and noting his pulse and respirations before and after. In these cases at Lausanne much attention has been given to estimating the functional efficiency of the patient. As already stated there is no parallelism between the radiological changes and the degree of incapacity. Only in 60 per cent. of cases was a reduction of vital capacity determined, and this held good in those in Stage 1 and in Stage 3. In the other 40 per cent. there was an increased capacity in relation to the theoretical values found by multiplying the theoretical basal metabolic figure by 2.5. Furthermore the maximal vital capacities do not show any reduction when corresponding to the stages of the disease. The values obtained, taken in the resting subject, give little indication of the degree of effort of which he is capable. For this reason it is necessary to get spirometer readings during exercise. There is at Lausanne an ergometer with which one may measure exactly any given output of energy. The work done is expressed in watts.

The maximum physical effort of which the patient was capable during a period of ten minutes in a 'steady state' was estimated. A 'steady state' was when the respiratory exchanges were stabilized without any
deficient oxygenation of the arterial blood and with a recovery period at the end of three minutes. No attention was paid to the output of energy when the patient is driven to exhaustion. If the energy output in ten minutes was 140, 130, 120, 100, 90 and 60 watts there was some relation between these readings and the stages of the disease. Patients in the second stage of silicosis may easily reach an output of 140 watts while some in the first stage only reach 120. But patients in the third stage, if capable of reaching 100 or 80 watts, cannot keep it up for ten minutes and so exhaust their respiratory reserves. Most of them show a fall in oxygen in the arterial blood. Patients are also found in the second stage who can only work up to 100, 80 or 60 watts, but may not reach 120, and some in the third stage aged 53 was found to be capable of reaching 120 watts in a "steady state". Another patient in the third stage aged 38, with a maximum respiratory capacity of 160 litres, reached 140 watts.

These results emphasize the lack of parallelism between the functional impairment and the morbid changes. The morbid changes are due not only to the deposition of silica, but to the associated hyperaemia of the bronchi, oedema, exudation and spasm.

P. H. Rossier has shown that vital capacity and respiratory rate are increased by injection of adrenaline, which causes relaxation of bronchial spasm. Similar changes are seen in exercise. The increase of dead space in these patients is connected with hyperventilation. Many factors are involved in the reduction in the patients' performances. Attempts are being made to find out more of the consumption of oxygen during exertion in patients with comparable diseases. If the partial tension of oxygen in the alveoli is not enough to convert most of the haemoglobin into oxyhaemoglobin then the consumption of oxygen will be highest when the patient breathes an atmosphere enriched with oxygen. The impaired action of the heart, due to myocardial changes, displacement of the mediastinum and changes in the capillaries from lesions of vasomotor nerves, will all affect the readings obtained. Many other factors are also involved, but changes in these patients must not be forgotten, especially as so many of them have witnessed the distressing development of the disease in their comrades. I workmen who merely exhibit structural changes are not entitled to compensation. To obtain this there must be loss of functional efficiency.


A correct diagnosis of silicosis must first be made, based on a knowledge of the hazard involved in an individual's occupation; the differential diagnosis from welder's lung, etc., must be considered. Normal clinical methods of examination give some picture of the disability; bronchoscopy brought on by forced ventilation may be an important cause of this disability. The observation of any dyspnoea during normal activities is important. Respiratory function tests should always be correlated with the clinical findings, the history and X-ray studies, and notice taken particularly of the degree of dyspnoea induced and the recovery times. The same equipment should be used throughout and a control series worked out from the normal individuals in the locality. Possible respiratory function tests are (1) measurement of tidal, complementary, reserve and residual air, and the vital capacity, (2) the normal minute ventilation and normal tidal volume, (3) the maximal minute ventilation and normal tidal volume, (4) the pulmonary reserve, and (5) exercise tests on the bicycle ergometer or treadmill ergometer, or by other methods, during which the expired air is collected and exercise minute volumes of air and oxygen are dyspnoea the closer does this figure approach the maximum minute ventilation. There is no substitute for time and experience in estimating pulmonary disability.


The big problem of evaluating the physical and mental capacities of all candidates for jobs is of such great sociological and economic importance that it overshadows the problem of the industrial capacity of the disabled, the latter problem is only part of the whole picture. The former has more than been allied to its success in promoting physical and mental hygiene, nutritional guidance, physical training and control of fatigue, and in the aiding of management in the selection of employees for specific types of work. Placement involves (a) an analysis of the job for physical requirements, (b) evaluation of physical capacity, and (c) matching capacities with the requirements of the job. It is necessary to realize however, that one of the most characteristic things about human beings is their variability, both in health and disease; and the greatest damage inflicted on either disabled or able-bodied by poor selection and placement, is not physical but psychological and results in loss of confidence, which may lead to more serious trouble with economic implications.

5100 different jobs in the federal service were analysed and their suitability for various kinds of disabled persons assessed. The jobs for persons with amputation of the thigh, 1464 for those with foot amputations and 50 for those with double leg amputations. The placement potentialities were broad and it was found that the frequency and severity of accidents were lower than those of an able bodied group of similar age, experience and occupational characteristics. For those with orthopaedic deformities of the leg 1373 jobs were possible, of the foot 1471, of both feet 46. Apart from deformities of the hip these people had the same accident experience as the able bodied. Jobs for those with deformities of the upper extremities numbered 534, but the safety records of this group were not as favourable in frequency or severity of accidents as those of the able-bodied.

With regard to cardiac patients, these should avoid occupations involving sudden spurts with unduly slack intervals of rest; they should have regular hours and favourable conditions of work, avoiding extremes of air pressure and temperature. The patients' capacity for economizing his energy should be considered, and it should be remembered that a heavy strain on the lower extremities is more easily tolerated than on the upper. No person liable to vertigo, syncope or sudden death should climb ladders, work near dangerous machinery or at high altitudes. Dusts induce cough and bronchial congestion and therefore should be avoided, especially by those with mitral disease, but any environment likely to cause infection of the upper respiratory tract should be avoided. Any occupation likely to cause anxiety or emotional disturbance should also be avoided. 1268 jobs were found suitable for cardiology, and these patients' efficiency and productivity compared favourably with that of normal persons. Their accident rates were slightly higher with respect to frequency but as good with respect to severity.

With regard to placement of those with pulmonary tuberculosis, the job must not overtax the working capacity of the individual, and the working conditions must not be such as to be conducive to reactivation of the disease; and such that the patient is not a danger to other employees. 1328 jobs were suitable. The patients were found to have greater physical efficiency as able-bodied persons, while their safety record was better. Their rate of absenteeism for sickness however, was high.

1269 jobs were found suitable for deaf workers whose productivity and efficiency was as good as the able-bodied, but psychological factors in individual cases may produce an accident rate higher than that of persons with normal hearing. 2175 jobs were found suitable for workers whose hearing and their productivity and efficiency compared favourably with the able-bodied though again psychological problems in individual cases increase their accident rate. They can often hear better in noisy
occupations. 2,080 jobs were suitable for those blind in one eye; their performance was good but the accident rate was high; it is believed that this is due to fatigue. They must be given jobs which do not cause danger to others. They must be taken to protect the remaining eye. Fifty-five jobs were suitable for the totally blind, and these people were found to have as good a performance as the normal.

K. M. A. Perry.


The industrially injured generally receive excellent surgical and hospital care, but recovery frequently lags in the convalescent period, and some cases do not get back to work because of the absence of a good introduction to work activity or appropriate placement when physical handicap has resulted from the injury. Inactivity prolongs disability and it sometimes develops discouragement or bad mental attitudes and fixations. No facilities have existed, however, for giving a medically supervised after-care to industrial cases that would prevent the development of these fixations.

Great success was reported from the Royal Air Force, who were giving a medically supervised after-care treatment, in the form of physical therapy and exercise, starting almost immediately following surgical operations. For the purpose of providing a facility where doctors could send the industrially injured, a Rehabilitation Center was opened in Boston in June, 1943. Physical therapy was given concurrently with occupational therapy consisting of prescribed work in shops and after recreational activities. Of the first ninety-nine cases admitted to this centre, all of which were serious injuries, over 70 per cent. were either fully or partially restored to work capacity.

There is a growing demand for such facilities which is a challenge to the medical profession and hospital services to provide them.

A. Thelwall Jones.


The views of industrial physicians and labour managers differ: the former is concerned with the amount and type of work an employee can do, the latter with the employee's job and skill. The physician's opinion is based on a physical examination supplemented by laboratory examinations and X-rays. Of 150,000 workers examined in the last four years, 79.85 per cent. were fit for all work, 16-12 per cent. fit for limited work and 5-3 per cent. unfit for work because of infectious disease, mental disorder or serious organic disabilities. An industrial employee must not be employed on work harmful to himself or create a hazard to others; limited employees are classified:--I. No hazardous machinery, II. No heavy lifting, III. Ground level work, IV. Avoid contact with other exposure to (special agent), V. No extensive walking or standing. VI. Special and Miscellaneous (for example, must work in a noise-free area). Employees returning after long illness should be classified before starting work. The employee's mental attitude is all important; with the wrong outlook, minor disabilities may be greatly magnified, and on the other hand, an over-ambitious employee may do himself harm. An adequate follow-up is essential as in particular the employee's immediate supervisor must be educated by personal contact by the medical department. To achieve full use of human power, supervisors who are completely familiar with production and technical methods required and able to guide them. Supervisors should be encouraged to refer problems to the medical department, and on transfer to a new job limited employees should be re-examined.

At the start of the scheme for employment of limited employees, the plant average was 10 per cent. and the highest percentage in any department 15 per cent. These figures have now been increased to 14 per cent. and 26 per cent. of limited employees. The success of the scheme allows the problem of the returning ex-service man to be faced with confidence especially if the word 're-employment' is used instead of 'rehabilitation.' It is estimated that 10 per cent. of ex-service men will have minor disabilities, 6 per cent. will be incapable of returning to their pre-war job. Only 15 per cent. of the disabled (1.5 per cent. of all ex-service men) will have handicaps needing special consideration. Greater emphasis must be placed on the psychosomatic and psychological aspect, though to submit all ex-service men to a detailed psychological examination (including tests) on return to the factory would be unnecessary and unwise. The ex-service man should be encouraged to resume his place as a normal man, rather than as a 'problem child' but all who do not settle down should be seen.

Industry does not 'owe' anything to the limited employee; properly employed the limited employee is not a hindrance, and the granting of special privileges transfers the employment of 'limited employee' to the realm of charity, unjustified unless grants-in-aid are made by the Social Security Board or State Rehabilitation Commission. Quite apart from medical ethics, caution must be exercised in telling the management about the limited employee's disability in case over-caution by the supervisor reacts to the employee's detriment. Physical disabilities are easier to prove, and the placement of an employee is always in a place where he is placed capable of doing a full job; but degenerative conditions present the greatest problem and, it has to be recognized, do result in increased risk to the employee and to industry.

T. A. Lloyd Davies.


The author describes a very ingenious method by which the blind can be employed on precision work. In manufacturing tapered roller bearings it is essential that the diameter of the various parts for anti-friction bearings be ground to within very fine dimensions of the specified sizes. Those parts falling over and under the specified size limit are detected and removed by means of an electronic device. To enable a blind operator to complete this very fine inspection with the same accuracy as a sighted worker, the Timken Roller Bearing Company has invented a sound detector which gives a high note indicating oversize, a middle note within the specified limits, and a low note indicating undersize. Thus it is possible for the blind to do inspection work within a twentieth-five million of an inch, using their ears. This apparatus is available to any industry willing to employ the blind for inspection work without any rights or royalties.

Blind employees do sound tests which are the final inspection of the assembled bearings for smooth and noiseless operation and also file testing by feel for hardness of steel. It has been found that the blind can do about 80 per cent. as efficient work as the regular employee.

R. S. Schilling.


From 35 years ago, when the question was whether to adopt a compensation law (all states now have a law except Mississippi) the problem today is how to broaden the law so as to include all workers and all types of industrial injuries. (Each state in U.S.A. has its own compensation law. In Michigan, Workmen's Compensation Law is administered by a commission and a lawyer describes its workings.) Only those workers whose employers are subject to the law are protected by it. Prior to 1943 the law was elective for all employers (40,000 employers being elected) but since that time the law is compulsory for all employers of eight or more persons (over 50,000 employers being subject). The Unemployment Compensation Law is similarly compulsory for employers of eight or more persons, and under this law 18,000

ABSTRACTS
employers are registered so that the majority of the 50,000 employers subject to the workmen's compensation law employ less than eight persons.

In 1937 scheduled occupational diseases were admitted for the first time. Many of these diseases occurred, for example, a grinder received compensation for pneumoconiosis but not a moulder working in the same room and exposed to the same hazard. The 1943 amendment removed the requirement that industrial diseases must be accidental to be compensatable, and general occupational disease was substituted for schedule disease. Compensation is paid both for injury due to a single event and not due to employment, for example, for hernia. It also may be paid for aggravated disease. To receive compensation a disease must be personal and be due to causes and conditions which are characteristic of and peculiar to the business of the employer and which arise out of and in the course of the employment. A dissenting judgment (of greater legal significance than the majority) is quoted in which a woman using the hands for manipulating bottles suffered from bursitis but because this type of work did not carry an increased risk of developing bursitis, she was not (in the opinion of the dissenting judge) entitled to compensation. A woman developing arthritis and partial subluxation of the proximal metacarpal joint of both thumbs in the course of filing castings was on this basis refused compensation by the commission, as the injury was not due to causes and conditions characteristic of and peculiar to the business of the employer. This is the author's opinion that is the criterion by which eligibility for compensation must be decided. Compensation is not intended to cover the chronic ailments arising in advancing years. Sometimes the division between natural ailments and injury is difficult and this depends not on the nature of the disease but on circumstantial evidence, for example, a hernia in a man doing heavy work is probably occupational in origin but in a man doing light work probably arises naturally. Consideration of these matters should be kept in the hands of competent persons of good judgment who know the difference between speculation and proof.

T. A. Lloyd Davies.


In changing the basis of workmen's compensation to a contributory scheme, the National Insurance (Industrial Injuries) Bill, 1945, should remove many of the workman's grievances with the present system, and, it is important to note, change the work of the medical profession. The employee will contribute to the Industrial Injuries Fund by weekly stoppage of pay 4d. for men, 3d. for women, 2½d. for boys under 18 years and 2d. for girls under 18 years. The employer will pay similar amounts. The payments are additional to the contributions to the National Insurance Fund, and already workers have said they intend to use this compulsory levy in an argument for increased wages. The fund will be aided, if the Treasury think necessary, by an Exchequer contribution equal to one-fifth of the aggregate amount collected, making a total (with the Exchequer's payment) of £275 million a year.

All persons under any contract of service or apprenticeship in Great Britain are insured (excluding the armed forces, police, certain workers not yet prescribed in other Crow workmen, or under a public or local authority). Of the 13.4 million men and 44 million women classified as employees in the Social Insurance Report, 1944, approximately 10% million will be insured for industrial injuries. In 1938, 400,000 persons received £15 million in compensation under the Workmen's Compensation Act, out of a population at risk of 7,800,000.

Benefits are not based on loss of earning capacity (with identical injuries) and the tendency to consider this particular section of the social insurance plan in isolation from the general scheme is unwise, and has raised industrial injury payments above the general level. No regard has been paid to the cost to the community, but even so the T.U.C. are pressing for an increase for the industrial injury benefits from 45s. to 55s. per week. The National Union of Mineworkers considers that the dangerous nature of their work warrants an increase of 50 per cent. increase in benefits. Differences in payment even within the industry and in any case the nation cannot afford an incentive to remain out of productive work.

Under the new system, a claim for benefit involves five persons, the claimant, employer, insurance officer, office clerk and doctor. Will this compensation, and will the introduction of government officials into an intimate health circumstance and a private matter between man and master cause difficulty? The scheme must be administered with the care specifically required, and to do this many officials will need training.

Medical certification of fitness for work will be required in increasing amounts, and steps may be taken to make certification more accurate and based on a knowledge of job requirements. In the interest of the patient, rehabilitation services should become the responsibility of the new health service rather than the exclusive field of the Ministers of National Insurance, Labour, Fuel and Power, Pensions and Health. A national accident service is a logical outcome. Medical boards, similar to or even the same as those now constituted by the Ministry of National Insurance, will be called upon to contribute to research in industrial health. This is especially important with the bill specifically empowering the Minister to promote research. But will the Industrial Health Research Board continue to be understaffed and inadequately housed, or will the Ministry set up its own research organisation? To conduct adequate enquiries into the cause of accidents a national health statistical department will be required. In addition to the Advisory Council provided for by the Act, it is suggested a medical advisory committee should be set up to advise the Minister from time to time (especially the assessment of prescribed industrial diseases) so that the influence of the medical profession may attain its full effect.

T. A. Lloyd Davies.


More patients complain of visual discomfort than poor vision, so satisfactory refraction calls for comfortable vision as much as a normal visual acuity. Poor vision is never uncomfortable, even if it is inconvenient but active use of the eyes for near vision is uncomfortable whether for an emmetrope or a corrected myope. The causes of discomfort are manifold, and astigmatism is the most common; others are asynkinia as in hypermetropes, where the amount of convergence required does not equal the amount of accommodation, excessive power of both accommodation and convergence which can in part be remedied by overcorrection of the refractive error, or low power of both accommodation and convergence which requires either orthoptics, fixed prisms incorporated in the patient's glasses, or a combination of the two methods. In measuring muscle balance theigital prism bar is not different in any way in such identical injuries) and the tendency to consider this particular section of the social insurance plan in isolation from the general scheme is unwise, and has raised industrial injury payments above the general level. No regard has been paid to the cost to the community, but even so the T.U.C. are pressing for an increase for the industrial injury benefits from 45s. to 55s. per week. The National Union of Mineworkers considers that the dangerous nature of their work warrants an increase of 50 per cent. increase in benefits. Differences in payment even within the industry and in any case the nation cannot afford an incentive to remain out of productive work.

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to the glasses themselves, are faulty measurement of interpupillary distance at the range at which the patient works, vertical imbalance induced by the correcting lenses, either when the lens grinding is at fault, when the patient looks down through two different powers of lens, or when there is no decentration to correct anatomical differences of height of the eyes. Some patients have an asymmetrical nasal bridge which again calls for decentration of the lenses. Cylinders used to correct astigmatism have certain physical, secondary prismatic effects or induce artificial cyclophoria which cause discomfort. Many cases of 'eye-strain' are due to low convergence with low accommodation, and these subjects require bifocal lenses. Untreated weak convergence accounts for more discomfort than all the others together, and patients can sometimes be helped with thyroid extract and a little base-in prism effect. Poor accommodation may be due to ciliary weakness or spasm, and result in having no reserve for close work, in which case a little overcorrection will give some reserve, which ought to be one-third of the total accommodation. A lens grinder cannot produce satisfactory lenses unless the refraction is accurate and his instructions complete in every detail.

J. N. Agate.


The industrial psychiatrist has three main functions, teaching, clinical practice and research. Managers, foremen, doctors, nurses and employees must be taught the facts of human behaviour. The more a man knows about himself and others, the less frustration will he encounter; the more executives know of human motivation, the more efficient they will be. Teaching should emphasize that any job analysis must take into account whether the job can give satisfaction to the worker and to what kind of worker.

The importance of psychosomatic medicine is not yet realized; many are still ignorant of all the persuasive symptoms of tension, even those who can evaluate it in gastro-intestinal and cardiac disorders are ignorant of the nature of many cases of tinnitus, dizziness, blurred vision, postural kyphosis, pruritus and many dermatoses. If an overload is on the man who is excessively keen on doing his job well, he will become ill and finally be lost to industry. Another cause of serious wastage of valuable employees is placing incompatible individuals together as when a highly gifted but emotionally insecure man is put in charge of an aggressive, task-oriented boss. Psychiatric principles must be applied by the whole industrial team, as the surgeon with his aspesis, the housewife with her insistence on pasteurized milk, the engineer designing a drainage system and applying the principles of bacteriology. The specialist psychiatrist should assess the personality at intake into industry, be available for consultation when required and, by suitable employment recommendations, ensure that nobody is employed where he will certainly break down. Research must discover what kind of jobs and situations produce excessive tension, in what kinds of persons serious degrees of tension will occur and how such tensions can be prevented and cured. E. H. Larkin.


If health is to be a positive conception, the patient must be considered as a whole in relation to his environment. To this study, the term psychosomatic medicine is applied. Medicine has become sectionalized, and in spite of some purely scientific advances in medical knowledge, a return to the practice of the art of medicine is the essential foundation for psychosomatic medicine. The status of an industrial physician as a specialist is the subject of controversy but the physician muscle to have a broad and broadening vision rather than the narrowing view of the specialist in other branches of medicine. Because of his opportunities of studying the patient's working and industrial environment, the industrial physiologist is in a favourable position to apply the principle of psychosomatic medicine. The sickness-prone worker may be of three types: I, those of poor physique, of bad heredity, from a bad home or suffering from 'just bad luck'; II, those with many complaints for which no organic cause can be found but who are actually ill; III, those with an organic disease complicated by psychic factors. The two latter groups present the greatest problem to medicine, industry and the community.

Treatment consists of explaining to foremen that such persons' complaints are genuine, the relief of anxiety and emotional tension, the adjustment of housing, money and other worries. Those with recent emotional upsets respond better to treatment than those whose symptoms originate from childhood. Because so few psychiatrists are interested in industrial medicine, the industrial physician must, by exercise of common sense, apply the principle of psychiatry to these cases.

(To English readers this paper presents some confusion in terms. The first part of the paper is an admirable exposition of the need for the study of social medicine—to which the author applies the term psychosomatic medicine. The second part explains the psychosomatic origin and the need for psychiatric treatment for patients whose symptoms are not, in the true sense of the term, psychosomatic in origin, i.e., Group I in the author's classification.)

T. A. Lloyd Davies.


Only organizations employing large numbers of persons can create a fully staffed mental health unit, but smaller firms might combine for this purpose. This would need a uniform and scientific system of personnel management, though in small firms management is largely on a personal contact basis which often leads to a satisfactory job adjustment, loyalty and morale. As Industrial Mental Health Service is in its initial stage, centralized services would enable useful data to be collected and offer special service, such as psychometric testing to small firms.

Symptoms of maladjustment vary according to the war position: in times of urgency the human factor tended to be emphasized by management, and the individual worker found increased satisfaction in his job. Slackening of the war effort and the consequent insecurity led to demands for changes. In large factories acute psychological conflicts and emotional disturbances especially in those who wished to be released from Government service.

In planning an industrial mental hygiene unit, administrators, personnel managers, and foremen, and even doctors require education in the need for such a unit. So long as psychiatry was based on instinct and interpersonal reactions, it had little to offer industry. Industrial psychology stresses the importance of the job as a major factor in the happiness of the normal adult.

Most of the patients referred to the Mental Hygiene Unit set up in July, 1943, as part of the U.S. Public Health Service, showed poor job adjustment. As experience was gained, this was shown to be less related to difficulties arising outside work and more to the job itself. In fact, good job adjustment is necessary for the attainment of a full life. But, in arriving at an account of the patient's work, medical and social background is needed. Because of the specialization of skill required, and the recognition of his dependence on other members of the group, the industrial worker is likely to be more outspoken in his requirements than agricultural or clerical workers. The ease with which patients discuss their difficulties is surprising, but probably due to the psychic need for the role of technical expert helping to solve the patient's difficulties. Transference on an adult level rather than on an infantile level takes place between patient and industrial environment, and full educational effort will be required. Job placement,
adequate supervision and training are especially important. In particular, the foreman must expand his role from production expert to a leader of those for whose work he is responsible.

T. A. Lloyd Davies.


Health risks of a toxic nature are relatively rare in New Zealand, but those that exist are important because so far they have frequently passed unrecognized. This country's system of social security aims at providing outside the factory the types of medical treatment, but makes no provision for the supervision of the health of workers at work. But there are a few factories in which progressive managements have appointed part-time medical officers and nurses. Nevertheless, where the doctor has been appointed his duties are directed towards curative rather than preventive work. The standards of first-aid and of first-aid equipment are low, individual sealed sterile dressings are unknown, and frequently no records are kept of persons treated.

The practice of preventive medicine in industry will be a new field for New Zealand doctors and nurses, but it can only be applied to industry if industrialists appreciate the importance of medical supervision which means a great deal more than a glorified casualty service or having a doctor 'on call'.

R. S. F. Schilling.


Owners of commercial, industrial or agricultural establishments in the Philippines are obliged to give free emergency medical attendance to their employees. This applies not only to private industry but to all Government establishments. Specific instructions are laid down as to the types of medical facilities to be given; their scope is determined by the numbers employed.

For thirty workers a stock of emergency medicines must be maintained under the charge of a nurse or other intelligent person. When the industrial population exceeds 400 persons, the owner must employ the services of a physician and provide a dispensary or an emergency hospital. The Bureau of Health has inspectors to see that the law is enforced.

Philippine industries include mining, lumber, sugar, rice, hemp, tobacco, textiles, rattan and leather. The author describes the sugar industry in detail. Although occupational health risks must exist in this industry, workers claim little knowledge of such illness. There has been no morbidity due to exposure to bagasse, but dermatitis due to phenolic sprays for cleaning occurred until steam was used as a cleaner. The plant medical service provides care for the worker and his family at a cost to the worker of 1 cent of his salary. Preplacement medical examinations are necessary by law, but there is no varying set of standards for jobs with different physical demands. All workers irrespective of their job must meet the same physical standards before they can work. The main contra-indications to employment are hypertension and tuberculosis. The latter disease is extant in the islands and its spread is feared by the people. Health education is very necessary because the average Filipino will not consult a doctor in the early stages of disease, but pamphlets have not been so successful as visiting nurses who can get into the positions and barrios.

There is a Workmen's Compensation Act which provides adequately for the disabled.

The employers are required to pay all medical and surgical costs following injury or illness incurred by one of his employees.

R. S. F. Schilling.


The U.S. Department of Labour has Bureaux of Labour Statistics, Labour Standards, and others to supervise the employment of women and children. The U.S. Public Health Service incorporates an Industrial Hygiene Division and Industrial Hygiene Research laboratories. Since 1935 various occupational disease laws and the Social Security Act have been in practice the knowledge gained from previous research. Industrial hygiene started by considering traumatic injury at work and has evolved to concern itself with protecting every worker in industry and with ensuring the greatest possible physical and mental health for each. Forty-nine official industrial hygiene units are located in thirty-nine States.

The Industrial Hygiene Division of the U.S. Public Health Service is made up of (1) The Field Operations Section; (2) the Dermatoses Section; (3) The Medical Unit, which is consultative and undertakes epidemiological investigations; (4) the Engineering Unit; (5) the Dental Unit; (6) the Nursing Unit; (7) the Chemical Unit, and (8) the Statistical Unit. The Division working in co-operation with all manner of other interested bodies kept watch over working conditions in government munition plants, and disabilities and deaths from toxic exposure in making explosives were greatly reduced; it made a study of shipyard workers and the effects of welding; it undertook to protect the health of workers in 379 foundries and 129 munition plants, and of lead smelters in twenty-two States: it studied conditions in chromate plants, and in aluminium reduction and asbestos textile industries. It concerned itself with nutrition of war workers and prevention of accidents and illness in a variety of industries.

Laboratory research was directed to the toxic properties of explosives and DDT, but in particular of non-inflammable battleship paints, and the ingredients of synthetic rubber. High altitudes, external temperature and pressures, oxygen breathing equipment, oxygen-helium resuscitation methods, and tropical conditions were all studied.

The Industrial Hygiene Division has assisted work in the individual States with funds, trained personnel, laboratory facilities, loan of equipment, consultative opinion and published literature.

The main post-war difficulty is the shortage of trained industrial doctors. In 1939 the State of Indiana had only 10 per cent. of its workers supervised by a full-time industrial medical officer. Fundamental research is to be directed to adjustment of handicapped war veterans to industry, industrial dermatoses, health problems of air transport, hazards of atomic energy production, and the toxicity of new chemicals and plastics.

J. N. Agate.


Industrial dentistry lapsed between the World Wars but was resumed in the recent one. Minimal standards were laid down in 1941 by the American Dental Association. The Dental Unit of the Industrial Hygiene Division of the U.S. Public Health Service has assisted state health departments to correlate their activities and tackle industrial dental problems, and three of them employ full-time dental officers. Routine oral examination with X-ray can be done in the reasonable time of five or six minutes. Some industrial hazards are first noticed because of symptoms related to the mouth, as in the case of sore gums occurring as the first sign of poisoning in a plant using metallic mercury to make electric batteries. The industrial dentist needs to know the physical and toxic hazards involved, and must keep full records. A five days' course was given in December, 1944, at Columbia University on subjects relating to industrial dentistry. The essential parts of an adequate service are (1) examination and diagnosis; (2) emergency treatment; (3) recording of findings; (4) dental health education, and in a small plant a local dentist could be 'on call' to give them, while in the larger, full or part-time services are the sounder proposition.

J. N. Agate.

Before the war the incidence of occupational dermatitis in the U.S.A. was one case in every hundred employed workers. In war industries the figure amongst new employees sometimes reached 50 per cent. The agents mainly responsible are petroleum products and greases, alkalis, and solvents. Full knowledge of industrial processes besides experience in dermatology is needed for accurate assessment of the causes of dermatitis. Postgraduate schools could train industrial dermatologists; the U.S. Public Health Service has instituted concentrated lecture courses. Lectures are suggested for industrial nurses, safety men and the workers themselves. Research has been hampered by lack of specialists; such problems as that of cutting-oil dermatitis need tackling. Large industries with full-time medical staffs can keep abreast of advances in dermatology, but the smaller ones are behindhand owing to lack of facilities.

J. N. Agate.


The case-hardening of steel consists essentially in bringing carbon into contact with the metal surface in such a state that the steel is made richer in carbon content. The process can be done in various ways, such as packing the metal round with charcoal or coke, or charcoal and heating in a furnace; or the metal may be suspended in a bath of molten sodium cyanide. Dermatitis should not occur from this latter process. The dermatitis described is due to a combination of the two above processes, when organic carbonizers are mixed with chemicals. In one process wood charcoal, impregnated with 5 per cent. sodium carbonate, is used, and in another, wood charcoal impregnated with barium carbonate is used. In the former case arsenical and severe eczematoid dermatitis is seen among the workpeople. Nearly all cases developed the rash after several months on the job and although the dermatitis is eczematoid, a striking feature of an early case is that the rash is seen to originate from the follicles. The cause of the rash is, undoubtedly, the sodium carbonate in the carbon pellets; even when the carbon is washed after use it is still strongly alkaline to litmus. Carbon containing barium carbonate was not considered so harmful.

The new employee should be warned to report any rash immediately, the risk should be explained in terms of war and the necessity allowed to do carbon packing straight after furnace work, when they are sweating. Frequent swilling of the arms with water, without proper drying, was a causative factor. Barrier creams were of doubtful value and gloves proved clumsy to work in. The only therapeutic measure of use in an established carbon packer’s dermatitis is immediate change of job and the usual treatment for eczema is given.

A. Theilwall Jones.


A table is given of the maximum allowable concentrations of some 130 materials which may contaminate the atmosphere of workshops. Figures listed include those laid down by a number of states, by the United States Public Health Service, and by the American Standards Association. Based on these figures, on animal experiments, and on industrial experience, there is a final column with suggested maximum allowable concentrations expressed in parts per million and milligrams per cubic metre. The basis and reliability of each of the values given in this final column is recorded and there is included brief abstracts from the literature.

R. S. F. Schilling.


Large-volume air samples are sometimes required, e.g., in an investigation of radium dust risks an 1800 cu. ft. sample was necessary for satisfactory quantitative determinations. The apparatus designed allowed efficient sampling rates as high as 65 cu. ft. per minute. The air was drawn through a bell-mouth type of inlet, 1/2 inches in diameter, fitted to a 2 1/2-inch flexible tube, and the dust or fume retained on the filter contained in the apparatus, which also contained the blower. When an ashless paper was not required the filter paper used was Eaton and Dikeman No. 613—21, and for gravimetric work Whatman No. 44. To provide a uniform filtration area, the unit consisted of a cone and a frustrum of a cone, with a total area of 1/55 sq. ft. The paper was prevented from collapsing or bursting by a wire screen. A photograph of the apparatus, with its manometer and flow regulating valve, is illustrated, and a description of the apparatus follows:

H. M. Vernon.


Poisoning by inorganic compounds of arsenic is dealt with fully in all standard treatises on toxicology. The toxicity of the organic compounds of arsenic has been described as complications of therapy, but little has been written of the effects of occupational exposure to organic arsenical compounds.

The authors estimated concentrations of arsenical dust calculated as As$_2$O$_3$ in the atmosphere of various parts of a plant making arsenophenamine and related compounds. The mean value of all manufacturing operations was 0.006 mg. per cu. ft., the mean for packaging operations was 0.0023 mg. per cu. ft. Concentrations range No. 44.

Urinary excretions were determined for workers in the manufacturing and packaging sections and for applicants for work. The ranges were as follows:—manufacturing 0.006 to 0.500 mg. per 100 c.c. of urine; packaging 0.003 to 0.037; applicants (controls) 0.006 to 0.028. At higher levels of exposure in the manufacturing department increased urinary excretion was present but only a fraction of the calculated inhaled arsenic could be demonstrated in the urine. Analysis of hair in four manufacturing workers gave values higher than those previously reported in the literature, but these workers showed neither symptoms of arsenic poisoning nor unusually high concentrations of arsenic in the urine. The arsenic in the hair was believed to be of external origin and to have no diagnostic value. Symptoms of extremely mild arsenic poisoning were found among certain employees working under conditions of heavy exposure in the manufacturing department.

Results of 323 complete blood counts on 35 arsenical workers were compared with 221 complete counts on a control group of men working under conditions of no exposed to arsenical compounds. No statistically significant toxic effect on the bone marrow of those exposed to arsenical compounds was demonstrated.

R. S. F. Schilling.


1,2-Dichloropropane (CH$_2$Cl—CHCl—CH$_2$) is widely used as a solvent and as an insecticide. In the present study various species of animals were exposed for seven hours daily, five days a week, in a chamber 4 x 4 x 6 ft. 400 litres of air per minute were drawn through the chamber, or a complete air change every seven minutes. A concentration of 2200 p.p.m. (or 10.4 mg. per litre) proved to be very toxic. Eleven of the sixteen guinea-pigs exposed were dead by the end of the fifth exposure,
and five out of twenty rats died after five exposures or less. Of four rabbits, two were dead after the second exposure. All but one of eleven mice died before the completion of one exposure. At a concentration of 1500 p.p.m. methane the slight showed little evidence of being affected while in the chamber, though the growth of rats and guinea-pigs was adversely affected. Mice were very susceptible, all of twenty-two mice dying when exposed for 24 hours. At a concentration of 1600 p.p.m. twenty-five out of forty-five rats died after exposure on six to fifty-nine occasions, and three out of twelve guinea-pigs (twenty-two to ninety-seven occasions). Of five dogs and four pups, four died after twenty-seven to ninety-six exposures. Many tests were made of liver and kidney function, but no abnormalities were discovered except a lowering of the plasma protein level, and this was probably due to voluntary starvation. Haematological studies gave negative results. Autopsies showed that guinea-pigs and rats had moderate to marked fatty degeneration of the liver, and moderate fatty degeneration of the kidney. Mice dying after a two-hour exposure to 1500 p.p.m. showed marked fatty degeneration of the liver. The four dogs which died after numerous exposures to 1000 p.p.m., showed moderate to marked fatty degeneration of liver, kidney, heart and adrenal gland.

When the toxicity of dichloropropane was compared with that of four other chlorinated hydrocarbons, it was found that all but one of them. Dichloromethane was the least toxic, repeated exposures of rats to 5000 p.p.m., over a period of six months, being well tolerated. Trichlorethylene was more toxic, only two out of six rats surviving repeated exposures to 3000 p.p.m. Carbon tetrachloride killed six out of thirty rats by the time that eight exposures to 2400 p.p.m. had been made. The most lethal hydrocarbon of all was dichlormethane, twenty-two out of twenty-eight rats being dead after fifteen exposures to 1000 p.p.m. These comparisons of the various chlorinated hydrocarbons are not exact, as different strains of rats and different diets were used. 


Welding operations incidental to the construction and repair of steel ships often produce distortion of the metal plates, especially on decks and bulkheads. Subsequent corrective measures include shrinking, which involves the application of heat to distorted sections of steel plate by means of an oxyacetylene flame. Shrinking is often necessary in small confined spaces, and the oxides of nitrogen produced may cause poisoning; e.g., a man exposed in this way died ten days later from chemical pneumonia. The acetylene torches used in the shrinking equipment commonly vary from a consumption of 60 cu. ft. to one of 250 cu. ft. per hour, and the temperature of the flame is about 6000 F. Samples of air were collected in the breathing zone of the unventilated compartment (of 600 cu. ft. capacity) in which the man was poisoned, and analysed by the phenol disulphonic method. A shrinking torch of 125 cu. ft. capacity was used. The only ventilation was through a single door, and eight air samples collected over a period of twenty-three minutes showed a concentration of oxides of nitrogen averaging 196 p.p.m., with a maximum of 480 p.p.m. The concentration was not appreciably affected by the water curtain surrounding the acetylene flame, nor by cool metal surfaces. It was found that (in a 700 cu. ft. compartment) the concentration of oxides of nitrogen varied with the size of the torch, being only 38 p.p.m. when the acetylene consumption was 16 cu. ft. per hour, 210 p.p.m. when it was 60 cu. ft., and 350 p.p.m. when it was 125 cu. ft. With natural ventilation, the average concentration of oxides of nitrogen was only 4 to 48 p.p.m. H. M. Vernon.


A procedure suitable for determining minute quantities of mercury in biological and related materials is described. Organic matter is destroyed by a special apparatus, by boiling first with a mixture of sulphuric and nitric acids, followed by a second boiling treatment after addition of potassium permanganate. Mercury is extracted from the digested acid-per- manganese digest (diluted to 1:8 N, in respect to sulphuric acid) by means of a chloroform solution of di-β-naphthylthiocarbazone. The chloroform extract is then treated with a sulphuric acid-sodium thiosulphate mixture to separate the mercury from copper. The final estimation of mercury is made by photometering di-β-naphthylthiocarbazone-chloroform extracts of the copper-free aqueous phase following treatment with potassium permanganate. At least 50 g. of blood must be used for the reliable estimation of concentrations as low as 1 mg. of mercury in 100 g. of blood. A table, which compares the mercury content of the blood and urine of exposed persons, shows that the mercury content of the blood is very low. Except in one case, the amounts were well below 10 mg. per 100 g. of blood. The highest, 0·029 mg. per 100 g., was found in a case where the urine level was 4·44 mg. of mercury per litre. The mercury-di-β-naphthylthiocarbazone complex is more stable than the analogous dithizone complex.

**A. Thewlil Jones**.


A bitch was fed on a diet containing 0·4 g. of sodium fluoride daily. Some of a group of puppies between the 28th and 98th day were suckled by their mother fed on this diet, while others were fed by their mother for four weeks and then on food containing 0·1–0·2 g. of sodium fluoride. Extensive changes were produced both in the bones and developing teeth dependent on the dose and length of time for which the fluoride was given. Small doses, starting at an early age and administered for a long time, produced a dense periosteal bone formation. In puppies suckled throughout by their mother, bone changes were observed before changes occurred in the tooth buds; the periosteal cells assumed osteoblastic function before the enamel forming cells were affected. Changes in the bones and teeth could not be prevented by a trivalent fluoride. Calcification of the enamel and endosteal bone in spite of continued administration of fluorine suggests that the pathogenesis of the lesions in bone are different in rickets and fluorosis. Fluorine may produce changes similar to rickets in the bones and dentine of puppies but its effect on the bones of older dogs differed from that of rickets. The author considers a full investigation into X-ray changes in the skeleton of children living in endemic areas and showing 'rotted enamel' should be carried out. K. M. A. Perry.


The thymol-barbitone test first described by Maclagan in the British Journal of Experimental Pathology in 1944, is a serum turbidity test which, when positive, is said to indicate disturbed liver metabolism. The authors applied the test to 715 blood specimens (49·6 per cent.) gave a positive reaction, and to 52 chemical workers exposed at apparently safe concentrations to various chemicals, some of which were known to be toxic. Of the latter group there were no false reactors, but none of 30 presumed healthy individuals had a positive test. Liver damage was indicated in the greater number of reactors in the hospital patient series, but in the authors' test set. In their investigations the validity of the test was lower than ascribed by Maclagan.

R. S. F. Schilling.