CHRONIC PULMONARY DISEASE IN SOUTH WALES COALMINERS. III.—EXPERIMENTAL STUDIES

Medical Research Council, Special Report Series, No. 250

Nos. 243 (1942) and 244 (1943) of the Special Report Series were devoted to the study of chronic pulmonary disease in South Wales coalminers; the first was a clinical and pathological study, and the second an environmental study. The present report is a sequel to these, and is concerned with experimental studies. It is the greatest contribution to our understanding of silicosis yet made. Broadly there are three sections: the first a study of the mineral content of the lungs of some 54 miners by King and Nagelschmidt, the second an investigation into the tissue reactions in the lungs of rats caused by selected dusts from the South Wales coalmines by Belt and King, and the third a study of the solubility of the dusts by King.

The lungs of the 54 workers in the coal-field were analysed chemically for silica, alumina, and coal; and the quartz, mica (sericite) and kaolin were determined by X-ray diffraction-pattern analysis in the minerals contained in the lungs which were isolated as residues. The results of these studies showed that the composition of the dust in the lung reflected the nature of the man's employment, and was identical with the dust to which he had been exposed at work. The pathological lesions in the lungs showed no relation with either the coal or kaolin in the dust; but the concentrations of mica and quartz ran more or less parallel with the degree of fibrosis observed.

Pure or 'clean' coal, that is mineral that contains more than 90 per cent coal, whether it is anthracite, bituminous or steam coal, produced in animals nothing more than the simplest type of foreign body reaction with minimal fibrosis. There was some concomitant emphysema and decreased vital capacity, and the animals lived six months less than controls. The histological picture was similar to the dust reticulation of coalminers. On the other hand, coal dusts with a siliceous content of more than 12 per cent. produced a reticulation fibrosis, a type of organization similar to carcinification. Mica and kaolin were often present and the amount of quartz was small, thus there is evidence that some silicates may be fibrogenic, though on the other hand the silicates comprising clod strata (shale) appeared to inhibit the fibrogenic properties of quartz. Specimens of pure mica (sericite) from South Wales produced the minimum of reticular fibrosis which can be a sample of mica (hydromuscovite or sericite) from another source used as a control, produced heavy nodular reticulin fibrosis similar to quartz.

The incidence of acute inflammatory reaction to a dust was closely paralleled with the higher grades of fibrogenesis. The initial impact of silica is on the phagocyte, and it is not until this is disintegrated that it falls on the connective tissue. The most severe reactions undoubtedly result from quartz, but the pathogenicity of this substance is reduced by clean coal and practically abolished by shale. The result is dependent evidently on an interplay of adjuvant and antiodial factors, the adjuvant effect of tubercle in human silicosis and the antiodial effect of aluminium are known, but there are probably many others which still remain unknown.

There is little doubt that the production of silicosis depends on the solubility of silica. It is proved that quartz particles coated with iron-oxide or alumina are less harmful than those which are not. It is surprising, therefore, to find that all South Wales dusts show low silica solubilities. Shales depressed the solubility apparently by releasing aluminium from their siliceous components to form an antiodial covering which could be stained with aurine, over the quartz particles; this effect, however, was not related to the total aluminium content of the sample. One of the most perplexing findings, however, is that anthracite coals depressed the silica solubility of quartz markedly, whereas steam and bituminous coals did so very much less; yet severe pneumoconiosis has a much higher incidence in anthracite workers. King suggests as an explanation that in some way bituminous and steam coal prohibit the solubility of the silica contained therein, whereas anthracite has not this property of combination (the content of siliceous matter is the same in all three), and so its mineral content can produce its effect, either under experimental conditions by inhibiting the solution of added quartz, or under conditions in the mine by not preventing the solution of siliceous material as other coals do.

K. M. A. P.

LE TRAITEMENT DES ACCIDENTS DU TRAVAIL MANUEL DU PRATICIEN

By J. Boudreaux, A. Hanaut and M. Iselin (with the help of Ch. Duvellery)


This work gives an account of the treatment of minor industrial accidents which are defined as those that can be dealt with satisfactorily without the help of general anaesthesia. The ground covered is therefore wide, although not everyone would agree that conditions such as fracture of the scaphoid and distal end of the radius should be treated in this manner. The book is primarily intended for the French general practitioner-surgeon who undertakes minor traumatic surgery, and the introduction gives in some detail the organization of a service of this kind not only describing the layout of the buildings required but also indicating the duties of the nursing staff as well as giving a note on the necessary materials and instruments. Stress is rightly laid on the devotion of adequate time by the operator to the procedures described and it appears that the ill-results which follow work done in haste by poorly trained surgeons in insufficiently equipped surroundings are to be met with in France as well as on this side of the Channel.

The main part of the book is, like Gaul, divided into three parts which deal respectively with what are called 'closed injuries' (contusions, sprains, dislocations, fractures and lumbago of traumatic origin), 'wounds,' and 'specialties.' Under the last named are chapters by appropriate specialists on ophthalmology, otolaryngology and stomatology. There is a short appendix on the emergency treatment of accidents.

The text is written in clear simple language and in general follows modern practice, but it is a reflection of the scientific isolation in which France has found herself until recently that a book published in 1945 should have no mention of the use of penicillin. Noteworthy also is the absence of reference to the rehabilitation of the injured worker and the important part played by the industrial medical officer in this phase of treatment.

Our French colleagues seem to have something to learn from us about this. The book has a good table of contents but lacks an index.

G. K.

MEMORANDUM ON CARBON MONOXIDE POISONING

Factory Dept., Ministry of Labour and National Service


So much has been written in the technical and physiological literature on the effects of carbon monoxide on man and animals, on blood in vitro and in vivo, and on tissue respiration protective covering etc. that it almost seems superfluous to issue further information on the subject. But it will be apparent to all who have to do with industrial acci-
dents that one can neither maintain too high a pressure in the drive to prevent accidents nor can one exhaust the infinitely various list of possibilities of industrial mishap. This memorandum, recently issued by the Factory Department, is no brilliant exposition, but is a solid and sensible attempt to warn people of the commoner ways in which such poisoning may occur.

Statistics of incidence and fatality due to CO for the years 1941–2–3 are given; these show that the annual incidence is fairly steady between 225 and 240, while deaths undergo some variation between 2.5 and 2 per cent. of the incidence. It must be remembered that these cases refer to those which caused more than 3 days disablement and so reflect probably only a small fraction of those who have experienced symptoms from CO. It would be of considerable interest to know at what levels of saturation workers find it necessary to stay off work for 3 or more days. It is significant that such noted investigators as Henderson and Haggard state emphatically that a claim for compensation should be rejected unless the claimant is exposed for at least 3 hours to conditions that could or did lead to 50 per cent. saturation of the blood, and was completely unconscious for at least 6 hours after return to fresh air. 'Short conditions of such severity,' they state, 'recovery is practically always complete.' Such criteria mean, of course, that there is likely to result from such exposure irreversible injury, probably in the central nervous system and brought about by the anoxaemia.

It seems generally agreed nowadays that the conception of chronic CO poisoning is fallacious. The memorandum states: 'Carbon monoxide is not an intrinsically a poison; it exercises its asphyxiant action not through any inherent toxicity in the carboxyhaemoglobin formed but simply through this power of using up most of the haemoglobin, which is the transporter of oxygen to the tissues.' As a physiological description of the action of CO this is very well but we suggest that it is unwise to talk of CO as 'not a poison' especially to a public not composed mainly of physiologists and in view of the sentence on the first page of the memorandum where it states: 'poisoning by CO is the cause of between one-half and one-third of all reportable gassing accidents which occur in factories.'

It must be confessed that the industrial circumstances in which CO poisoning occurs are difficult to overcome especially where hand operations are in use, for example in manual charging of blast furnaces. Dependence on wind direction and ample space to avoid escape of gas seems poor comfort these days; the fact is that many of our plants are out of date and at times we work short of factories in order. The memorandum offers useful hints on how to minimize the hazards in various operations and instances safety rules drawn up by a steel-making firm for the instruction of workers. It is a valuable inclusion in a Government pamphlet. Instruction of workers in the dangers inherent in this work is not as universal as it ought to be. The various arguments adduced against this would all become irrelevant if intelligent co-operation were obtained between workers, their unions and employers.

In the description of the effects of various concentrations of CO the memorandum closely follows the work of Henderson and Haggard, but departs from them in recommending subcutaneous strychnine or pituitary extract as of great value in serious cases. These authorities have shown how large doses of intravenous and intracardiacs medications as not only valueless but even harmful in the field. The great thing in treatment of a serious case is to re-establish respiration at the earliest moment by the Schaefer method, assure an adequate intake of O₂ and CO₂, and combat shock. The memorandum rightly stresses that the first few seconds may determine everything and save life.

In the matter of methods of detection and estimation of carbon monoxide in the atmosphere, it could have been helpful if a short critical review could have been included in the various methods recommended. For our part the only reasonable method is a continuous recorder, as otherwise the usual sequence will be calamity followed by determination of concentrations.

M. W. G.

OUTLINES OF PHYSICAL METHODS IN MEDICINE

By G. D. Kersley, M.D., F.R.C.P.

(William Heinemann, London. 1945. Pp. 85. 6s.)

Physical medicine is a curious and rather illogical division of medicine, and when it goes beyond the normal group of treatment, massage, electro-, helio- and hydrotherapy, and includes occupational therapy, it is even more illogical still. The author is right when he says that the abysmal ignorance and consequent lack of interest of many of the medical profession in physical medicine invited exploitation by the charlatan and provided little encouragement to those legitimately and conscientiously applying these matters. Doubtless the concept of rehabilitation will right these wrongs. No physician or surgeon can regard the treatment of his patient as complete until that patient is satisfactorily re-employed and this will undoubtedly require new methods. It would be better that the orthopaedic surgeon and the specialist in rheumatic diseases each controlled his own treatment; this is so in other countries. However, if the division of physical medicine is persisted in England, then the closest liaison must be established between physical medicine and other branches of medicine, which gives an elementary account of the methods of physical medicine, is greatly to be welcomed at the present time and will enable the medical student and practitioner to acquire a knowledge of the subject required.

K. M. A. P.

A GUIDE TO HEATING, VENTILATION AND LIGHTING

By W. Douglas Seymour

(Oxford University Press, London, New York and Toronto. 1944. Pf. 90. 6s.)

The author of this short book sets out to explain heating and ventilation in terms which will be understood by 'ordinary people, who by profession are probably baker, banker or billiard-marker.' But he does not fully succeed in his purpose, because, unreasonably, his language rapidly becomes technical, for example where he discusses methods of measuring temperature or the significance of daylight lighting. However, the potential misfortune of the billiard-marker is undoubtedly the fortune of the industrial medical officer. The book is at once short, clear, comprehensive, and inexpensive, and is one therefore that can be confidently commended to doctors employed in industry, not as a volume for permanent reference but as an effective introduction to a complex subject. The book is divided into two main parts: heating and ventilation, and lighting. The effect of these phenomena on our ability to work is explained in simple terms. If conditions are made comfortable at the place of work—the ultimate aim of heating, ventilation, and lighting—then productive effort is not interfered with, so there is mutual benefit to all parties. The author asks himself the question 'Why are heating and ventilation necessary?' and gives the answer in simple physiological terms. This leads to chapters on old and new ideas; measurements; ventilation in the classroom; and some description of modern methods of heating and ventilation. Similarly, the answer to the question 'Why do we need light?' supplies the material for the second half of the book. Vision is possible only where there is light, so here is an immediate relationship between medicine and engineering. This link for the industrial medical officer is one of paramount importance; he should be aware of the material working environment the better he can apply his clinical knowledge. It is no doubt selfish to suggest that the book would have been improved, from our point of view, by more adequate references and by the provision of an index.

A. E.