

BRITISH JOURNAL OF INDUSTRIAL MEDICINE

VOLUME ELEVEN
1954

EDITOR
RICHARD SCHILLING

LONDON
BRITISH MEDICAL ASSOCIATION
TAVISTOCK SQUARE, W.C.1

EDITORIAL COMMITTEE

| | |
|-----------------------|--|
| J. M. BARNES | T. G. FAULKNER HUDSON |
| SIR FREDERIC BARTLETT | DONALD HUNTER |
| THOMAS BEDFORD | R. E. LANE |
| G. R. CAMERON | A. MEIKLEJOHN |
| C. M. FLETCHER | J. N. MORRIS |
| J. C. GILSON | L. G. NORMAN |
| M. W. GOLDBLATT | J. R. SQUIRE |
| A. BRADFORD HILL | EDITOR, <i>British Medical Journal</i> |

GENERAL ADVISORY BOARD

| | |
|--------------------|---------------------------|
| A. J. AMOR | E. R. A. MEREWETHER |
| SIR HENRY BASHFORD | D. C. NORRIS |
| G. P. CROWDEN | K. M. A. PERRY |
| T. A. LLOYD DAVIES | H. OSMOND-CLARKE |
| SIR WILSON JAMESON | DONALD STEWART |
| J. M. MACKINTOSH | SIR REGINALD WATSON-JONES |

*Appointed by the British Medical Association
and the Association of Industrial Medical Officers*

GENERAL ADVISORY BOARD

A. J. AMOR
SIR HENRY BASHFORD
G. P. CROWDEN
SIR WILSON JAMESON
J. M. MACKINTOSH

E. R. A. MEREWETHER
D. C. NORRIS
K. M. A. PERRY
DONALD STEWART
SIR REGINALD WATSON-JONES

President of the Association of Industrial Medical Officers and Hon. Editor of the Transactions of the Association of Industrial Medical Officers *ex officio*

APPOINTED BY THE
BRITISH MEDICAL ASSOCIATION AND THE ASSOCIATION OF INDUSTRIAL MEDICAL OFFICERS

NOTICE TO CONTRIBUTORS

The *British Journal of Industrial Medicine* is intended for the publication of original contributions in industrial medicine from workers of any nationality. It also provides sections for book reviews and abstracts.

All papers submitted for publication should be referred to Dr. Richard Schilling, Nuffield Department of Occupational Health, University of Manchester, Clinical Science Building, York Place, Manchester 13.

Papers are accepted on the understanding that they are contributed solely to this Journal, and that they are subject to editorial revision. Papers must be typewritten on one side of the paper only, with double spacing, and with a margin of at least 1½ in. Where half-tone reproduction of x-ray illustrations is required, authors should send in the original film and not prints. Photographs and photomicrographs should be printed on glossy paper, and should be unmarked. Charts and graphs accompanying papers should be carefully drawn in black ink on tracing linen or Bristol board or stout, smooth, white paper. Any lettering on these drawings to be done in the editorial office should be lightly inserted in pencil.

References should be arranged according to the Harvard system. When a book is referred to, the place and year of publication, edition and page should be given. In the text the year of publication must follow the author's name, more than one paper in any one year being indicated by a small letter (a, b, c) after the date. No numbering of references is necessary. At the end of the contribution references are arranged in the alphabetical order of the authors' names. The reference details are given as follows: Author's name, initials, year of publication (in parentheses), title of periodical (in italics, abbreviated according to the World List of Scientific Periodicals), volume number (bold type, Arabic numerals), and first page number (ordinary type, Arabic numerals), thus:

Dunn, C. W. (1940). *J. Amer. med. Ass.*, 115, 2263.

Contributors will receive one proof in page, but it is assumed that all but verbal corrections have been made in the original manuscript; an allowance at the rate of ten shillings per sheet of sixteen pages is made for alterations in the proof (printer's errors excepted), and contributors will be responsible for any excess.

Twenty-five free reprints of articles will, if desired, be given to contributors. A limited number of additional reprints at cost price can be supplied if application is made when returning proofs. An estimate of costs will be given on application to the Publishing Manager, British Medical Association.

Papers which have been published become the property of the *British Journal of Industrial Medicine* and permission to republish must be obtained from the Editor:

Application for advertisement space should be addressed to the Advertisement Manager, British Medical Association, Tavistock Square, London, W.C.1.

NOTICE TO SUBSCRIBERS

Subscriptions are payable to the British Medical Association. Address: British Medical Association House, Tavistock Square, London, W.C.1.

and treats the worker as a person and not merely as a productive unit, can do much to bring contentment and at the same time increase production.

The worker, also, has his responsibilities. Where means of protection against personal injury are provided he should use them. Where certain acts are prohibited in the interests of safety he has a strong moral, as well as a legal, duty to refrain from them. Otherwise he may endanger the lives of others as well as himself.

Without the full cooperation of the worker full success is unlikely, but the major responsibility rests with the employer. In that connexion I quote two axioms laid down many years ago by Sir Thomas Legge :

(1) "Unless and until the employer has done everything—and everything means a good deal—the workman can do next to nothing to protect himself, although he is naturally willing enough to do his share.

(2) All workmen should be told something of the danger of the material with which they come into contact and not be left to find it out for themselves—sometimes at the cost of their lives."

The scientist should not offer industry new processes or materials, nor should industry accept them, without first ensuring that they are unlikely to cause injury to health.

The full cooperation of the trade unions is necessary. They should seek for good conditions of work rather than for "danger money" to compensate for bad.

The full achievement of the aims of occupational hygiene calls for the devoted work of scientists, cooperating with each other and with industry, in seeking for a fuller understanding of the relation between man and his environment, and in endeavouring to remove any hazard to health with all speed, once it has been recognized, even though the perfect method of assessing the hazard may not yet have been found. Such research is likely to be arduous and often prolonged, and it may not bring resounding fame to the researcher but he will be making his contribution towards the welfare of mankind.

Finally, a yet stronger sense of mutual obligation is needed, so that employers will seek to provide healthful conditions as a moral duty, while employees will readily use the means of protection provided, as a duty to themselves and to their fellows.

So, health and happiness may be promoted, and, I believe, material prosperity increased.

DR. HENRY F. SMYTH, President of the American Industrial Hygiene Association, conveyed formal congratulations and best wishes and presented the Society with a gavel on behalf of his Association.

Measuring the Workers' Environment

S. A. ROACH

From the Pneumoconiosis Research Unit of the Medical Research Council, Llandough Hospital, Nr. Cardiff

Although harmful materials may enter the body by ingestion with food or by absorption through the skin, in many industries their most important mode of entry is by inhalation. The material may, like poisonous gas, be immediately dangerous, or its effects may be the result of the accumulated exposure of a life time. The problems arising in determining the risk to health by means of measurements of the environmental conditions may appear at first sight to be very different, but I hope to show in this paper that they are actually very similar, if not identical.

The Period of Accumulation

A substance may enter the respiratory tract in the form of solid particles or liquid droplets or as a gas. Solid particles and liquid droplets are deposited on the upper respiratory tract, the coarser particles being deposited first and the finer particles sedimenting out in the deeper parts of the tract. If they are not immediately dissolved the coarser particles are removed by ciliary action and may subsequently be swallowed. The finer particles which have been deposited in the alveoli may remain in the lungs indefinitely if they are insoluble, so that the amount of dust in a man's lungs is roughly proportional to the product of his age and the average concentration of dust to which he has been exposed since birth.

On the other hand a relatively soluble dust such as lead is absorbed in the lungs so that it fairly rapidly accumulates in the blood, tissues, and skeleton, and is eventually excreted. The rate of solution increases with the amount of material deposited in the lungs and the rate of excretion of the material increases with the amount in the body, so that under exposure to a constant concentration a level of equilibrium will eventually be reached when the amount in the body is such that the rate of excretion just equals the rate of deposition in the lung.

In contrast to coal and silica, the lead in the body is slowly excreted when exposure ceases and the lead content usually reaches normal values within about 18 months (Kehoe, Thamann, and Cholak, 1933). Thus the amount of lead in the body is determined by the level of exposure over the previous 18 months and, to a great extent, by that within the previous few weeks.

The period of accumulation is even shorter in the case of harmful gases. Both absorption and elimination take place in the lungs, and, once the blood becomes saturated, accumulation in the rest of the body (when it takes place to any significant extent) is dependent on the concentration in the blood. For example, with a vapour such as benzene, saturation of the blood is reached within a few minutes; and saturation of the tissues is reached in two or three days (Schrenk, Yant, Pearce, Patty, and Sayers, 1941).

excess for men suffering from peptic ulceration is strikingly brought out in the tables. The hope is expressed that further analyses of sickness experienced in the insured population will be possible. It is to be hoped that age will be taken into account in this extended work.

Retirement Pensions.—Nearly three-quarters of the total expenditure on all National Insurance benefits during the year ending March 31, 1952, was devoted to retirement pensions which took 275 million pounds. It is estimated that 25 years hence this figure will have grown to nearly £700 million. Earlier reports have included analyses of samples of persons reaching pensionable age, but in view of the importance of the subject it has been decided to undertake a full enquiry to discover the importance of various factors influencing people in their decisions to retire or continue at work. For instance, it is not known how far deficient health and lack of opportunity of suitable employment contribute to this decision. Similarly the effect of superannuation schemes and the practices of employers and trade unions are influences the importance of which had not so far been assessed.

Injury Benefit.—The total number of claims for injury benefit in 1952, the rate for which was raised from 45s. to 55s. a week in July, was 775,000, a slight increase over the number in 1951, but still below the figure for the two previous years.

The great majority came from the heavy industries, and coal-mining again accounted for more than one-third. About 5% of insured men and 1% of insured women received injury benefit in the course of the year, the average periods being about four and five weeks respectively. Industrial injury benefit cost over £8½ million for the year ended March 31, 1952.

The experience in the working of the Regulations under which nurses and certain health workers are insured against tuberculosis shows that almost 800 such claims are successful each year.

Disablement Benefit.—The Report indicates trends in the development of disablement benefit (which in 1952 cost £7 million). The number of claims for disablement benefit has risen each year and was 96,000 in 1952, as compared with 86,000 in 1951. Nevertheless, disablement benefit is only claimed by a small minority of injured people. In 1952, the claims for disablement benefit were only just over 12% of the claims for injury benefit.

The number of disablement pensions rose by 19,000, or one-third during 1951 so that 76,000 disablement pensions were being paid at the end of the year. Of these three-quarters were for accidents and one-quarter for prescribed diseases. At the end of 1951, nearly 40% of the disablement pensions, including those for pneumoconiosis, were being paid to colliery workers who represent less than 5% of the insured population. About 10% were being paid to women, who are normally employed in the lighter industries. Nearly two-thirds of the pensions were for disablement of 20 or 30% and only about one-quarter for more severe disablement. Less than

4% of the pensions were at the 100% rate. Those still 100% disabled by industrial accidents after two or three years represent less than one in 2,000 of the people who claim injury benefit for accidents at work.

Finance.—The Report deals at some length with finance and contains a statement by the Government Actuary. Each year there has been an excess of income over expenditure but this is now changing. Additional expenditure resulting from higher rates of pensions and other benefits and the steadily increasing number of people who will become eligible for these are the cause of this change. Expenditure will begin to outstrip income by 1954/55, and in 25 years the deficiency to be met by the Exchequer each year is likely to be in the region of £417 million. The Government Actuary points out that this is not a new feature but is an inescapable result of granting full pension rates to contributors of all ages and to existing pensioners, even though they have not paid the requisite contributions and of the method of finance adopted by the State to meet the huge liability thus created.

The Industrial Injury Fund is not likely to become a burden in this way. Excess of receipts over payment amounted to £19 million during the year and the balance in the fund on March 31, 1952, was £78 million. The Report emphasizes, however, that this balance is essential at this stage if the fund is to remain self-supporting in the future since the annual expenditure on disablement pensions will increase automatically for many years.

This report is full of interesting information and should be widely read by medical men in industry.

R. E. LANE

BOOKS RECEIVED

(Review in a later issue is not precluded by notice here of books recently received.)

Vorbeugende Gesundheitsfürsorge. By W. Hagen. (Pp. 131. DM. 7.20.) Stuttgart: Georg Thieme Verlag. 1953.

Physical Medicine and Rehabilitation. Edited by Basil Kiernander, with Introduction by The Rt. Hon. Lord Horder. (Pp. 610; illustrated. 63s.) Oxford: Blackwell Scientific Publications. 1953.

Die entschädigungsflchtigen Berufskrankheiten. By M. Bauer. (Pp. xii + 176. DM. 9.60.) Stuttgart: Georg Thieme Verlag. 1953.

Lesioni del Cristallino da Radiazioni industriali. By Felice Redaelli. (Pp. 40. Lira 320.) Libero docente di patologia oculare e clinica oculistica, University of Milan.

Risiko und Kosten in der Krankenflegeversicherung. By Alfred J. Hosch. (Pp. 127. Sw. frs. 12.) Berne: A. Francke AG. Verlag. 1953.

Zur Genese des Diabetes mellitus und des Bronchialasthmas. By M. Bauer, with Foreword by Cl. Dierkes. (Pp. 113; illustrated. DM. 9.60.) Stuttgart: Georg Thieme Verlag. 1953.

Rudolf Virchow. By Erwin H. Ackerknecht. (Pp. 304 ; illustrated. \$5.00.) The University of Wisconsin Press. 1953.

Symposium on Fatigue. Edited by W. F. Floyd and A. T. Welford. (Pp. viii + 196 ; 47 plates. 24s.) London : H. K. Lewis. 1953.

Sécurité et Hygiène du Travail dans la Verrerie à la Main. (Pp. 144 ; 50 figures. Fr. frs. 200.-) Paris : Institut National de Sécurité. 1953.

Leistungssteigerung—Leistung, Übermüdung, Gesunderhaltung. By M. Hochrein and I. Schleicher. (Pp. 283 ; 53 figures. DM. 27.-) Stuttgart : Georg Thieme Verlag. 1953.

Leibübungen mit Körperbeschädigten, Vol. II. By Hans Lorenzen. (Pp. 249 ; 227 figures. DM. 22.50.) Stuttgart : Georg Thieme Verlag. 1953.

Toxic Solvents. By Ethel Browning. (Pp. 168. 18s.) London : Edward Arnold. 1953.

Pneumoconiosis Abstracts, Vol. I, 1926–1938. (Pp. xi + 347 ; illustrated. 63s.) London : Sir Isaac Pitman. 1953.

Strahlenschutz und Sonstiger Arbeitsschutz bei der medizinischen Anwendung von Röntgenstrahlen. By Wilhelm Ernst. (Pp. 97 ; 22 figures. DM. 7.80.) Stuttgart : Georg Thieme Verlag. 1953.

Verhandlung der Deutschen Gesellschaft für Arbeitsschutz, Vol. I. By Edward Mager. (Pp. 146 ; 36 figures. DM. 20.-) Darmstadt : Verlag von Dr. Dietrich Steinkopff. 1953.

Outlines of Industrial Medicine, Legislation, and Hygiene, 2nd ed. By James Burnet. (Pp. 122. 10s. 6d.) Bristol : John Wright ; London : Simpkin Marshall. 1953.

THE OCTOBER (1953) ISSUE

The October (1953) issue contains the following papers :—

Dust Sampling in the Control of Coal Miners' Pneumoconiosis.

A Method of Relating the Incidence of Pneumoconiosis to Airborne Dust Exposure. By S. A. Roach.

The Nature of the Variability of Dust Concentrations at the Coal Face. By P. D. Oldham.

The Importance of the Time Factor in the Measurement of Dust Exposure. By B. M. Wright.

Airborne Dust in Coal Mines : The Sampling Problem. By W. M. Long.

Mortality in Relation to the Physical Activity of Work. A Preliminary Note on Experience in Middle Age. By J. N. Morris and J. A. Heady.

Health Problems in the Manufacture and Use of Plastics. By Dr. Kenwin Harris.

Age and Work. A Study of 489 Men in Heavy Industry. By I. M. Richardson.

Miscellanea :

Charles Turner Thackrah in the Agitation for Factory Reform. By George Rosen.

A Mobile Consulting Room. By G. O. Hughes.

A number of copies are still available and may be obtained from the Publishing Manager, British Medical Association, Tavistock Square, W.C.1, price 12s. 6d.