pure occupational groups. No attempt was made to do this and there was no discussion of the purity of the ultimate occupational groups used for analysis. It is not, therefore, possible to accept the authors' conclusions concerning the occupational origin of abnormalities which they describe. However, their chief conclusion, namely that steel workers show a higher incidence of radiographic abnormalities than iron workers and that the highest incidence is in the fettling shop, may well be true as it confirms previous findings by the Silicosis and Asbestosis Medical Board and by other workers in this field.

A surprising frequency of slightly abnormal radiographs was observed in the younger workers. The authors suggest four entirely irrelevant explanations and do not mention the possibility that the interpretation of the radiographs, whose unreliability they have admitted, may be at fault.

Pattern shop workers, exposed only to wood dust, from their radiographs also showed evidence of dust inhalation. It is not possible to be certain of the cause or the reliability of the radiographic findings, since there is no discussion of the previous occupations of these men, nor of the observer error in interpreting such slight radiographic changes.

No important conclusions are derived from the spirometric and clinical investigations, and the observations on the incidence of tuberculosis in various occupational groups are not of much value, as no reference is made to the age distribution of men in the groups. The final conclusion is that the incidence of active tuberculosis is much the same as that found in the general population.

The account of the dust sampling investigations could have been given very briefly. A detailed analysis of the dust samples taken is difficult to justify in view of the authors' own opinion that "on account of the doubts and difficulties arising in the valuation of the samples and of the time and labour consumed in this work . . . dust counts in iron foundries have a limited value". Similar criticism can be made of the publication of elaborate chemical analyses of both samples of dust, nearly the whole of which were of a particle size incapable of entering the lung.

In spite of its scientific and logical fallacies the report has its values but to claim that it contains a great deal of information of scientific value is hardly justified.

C. M. FLETCHER

The Chemistry of Industrial Toxicology. By Hervey B. Elkins. 1950. New York: John Wiley & Sons, Inc.; London: Chapman and Hall, Ltd. 24 illus., 366 refs. Pp. 406. Price 44s.

The Chemistry of Industrial Toxicology by Hervey B. Elkins is a good book. The author has drawn freely on his own experience in Massachusetts to pack its 406 pages with a great deal of valuable information.

The book is arranged in a logical manner that will appeal to the average practical chemist. It has clear and well labelled figures, particularly those in Chapter XVI, and its tables leave little to be desired. An attractive feature is the parallel recording of concen-

tration with vapour pressure of certain substances, e.g., mercury (Table 6, p. 39), a time-saving aid to a chemist who has to give a quick and intelligible answer to his colleagues.

The references are representative and are obviously selected to aid further research, but it is a little exasperating to the reader to find more than thirty merely labelled "private communication" without always specifying the nature of the communicated subject matter.

Although most chemists tend to be individualists, they should attempt to incorporate in the current laboratory notebook any recent and time-saving modifications to a method which will help the assistants, particularly when these are semi-skilled and are faced with doing not tens but hundreds of analyses. It is, therefore, somewhat of a disappointment to find that relatively recent and tested methods have not always been mentioned, as for example, the use of solochrome brilliant blue B.S. in place of alizarin in the analysis of fluorine.

It is interesting to note that dinitro-*para*-cresol is described whereas dinitro-*ortho*-cresol is only mentioned. This may be justified because the former is used as a food-colouring agent in some countries, but as the latter is widely used as an insecticide, a little more information would be welcome, particularly in view of the paragraph which is devoted to a description of parathion and other organic phosphates.

On the whole, Chapter XVI on air sampling devices is informative and clearly set out. Since physicists are as much associated with industrial science as chemists, one would like to see a little more critical discussion of the electrostatic and thermal precipitation methods for dust collection. There is considerable divergence of opinion as to the practicability and reliability of the thermal method, particularly concerning the visual method of dust counting, which is liable to give variable results even with skilled workers. In view of this shortcoming there is an obvious need for more direct and reliable methods.

The inclusion of a chapter on fallacies and unsolved problems is a happy choice as it stimulates critical thought in a variety of ways, and the author, if he does not always attempt to offer solutions to some of the problems, leaves the reader with one or two useful openings. The comments on beryllium and amorphous silica stand out as examples.

The book is useful and informative, and although the cost may preclude possession by individual industrial chemists, it should form a useful addition to both chemical and medical industrial laboratories.

D. GRAHAM HARVEY

Recent Advances in Physical Medicine. Edited by Francis Bach. 1950. London: J. and A. Churchill Ltd. Illustrated. Pp. 490. Price 27s. 6d. net.

This volume is a collection of articles written by specialists under the editorship of Francis Bach. It shows the great development that has taken place in this department of medicine during the last 30 years. The old massage department of those days was the

only means of physical medicine employed after the lesson of Sir Robert Jones had been so quickly forgotten at the end of the first world war. About 20 years ago, Moore of Crewe began to bring us back to more realistic methods of rehabilitating injured workmen, and finally in 1938 Nicoll of Mansfield established this method of treatment on a firm practical basis. During the recent war this method tended to be overdone and to push actual physiotherapy into the background, but since that time a better balance has been struck between work in a gymnasium and the work of the physiotherapists. We now realize that a combination of these two methods is the ideal.

This book describes the methods of electrodiagnosis and treatment by specialized equipment, but these have little interest to the doctor in industry. The physical methods of treatment, however, are of very great interest to the industrial medical officer. Section 3 is especially to be recommended as it deals with orthopaedics, and treats in a general manner such subjects as posture, which is so important, especially in young adults, as the maintenance of correct posture can add so much to the happiness and efficiency of the worker. The chapter on foot faults is also excellent and should be studied by every medical man who has control of work-people. After discussing the mechanics of the foot it shows how simple physical remedies can correct painful deformities, and this is especially important as many of these methods can be applied in an industrial medical department.

Section 6 deals with rehabilitation and resettlement. The general principles laid down should be studied and known by every industrial medical officer so that he can cooperate with the hospitals and ensure that there is no break between the time of completing treatment and the resumption of work. Much can be done by the industrial medical officer if he keeps in close touch with the hospital and understands the case thoroughly so that he can make the job fit the disabled person. The Vauxhall rehabilitation workshop is an example of this type of coordination, and its working is fully described. This type of work can, of course, be done most effectively in a large organization, but the principle can be applied in smaller workshops.

This book contains much good material intelligently written, and gives a balanced picture of the conditions that can be treated by physical methods. It is easily read and the reader does not feel overwhelmed by detailed discussions on particular conditions.

There are, however, many references for the reader who wishes to go more deeply into any aspect of this vast subject.

J. CRAW

Researches on the Measurement of Human Performance.

By N. H. Mackworth. 1950. Medical Research Council. Special Report Series No. 268. London: His Majesty's Stationery Office. Pp. 156. Price 4s.

Since the end of the war much has been published on studies of psychological problems in the armed services. Most of the work done has been concerned with the techniques of selecting recruits, or rather sorting them out into the appropriate training classification. This

report, however, covers a different field, by describing laboratory investigations of several factors affecting the efficiency of certain operational groups.

As the war proceeded a number of important problems arose in connexion with human efficiency. If a radio operator in a warship under the stress of battle conditions were to misread a message or to transmit a message inaccurately, the fighting efficiency of the ship might be seriously impaired, with far-reaching and serious consequences. In his book, *The Ship*, C. S. Forester describes the many conflicting interests that have to be resolved by the naval architect. The physical comfort of the crew in their operational stations generally takes a low place in the list of priorities, and yet it may play an important part in the overall efficiency of the fighting unit.

To what extent is efficiency impaired by adverse climatic conditions in an operational room? What happens to men who are required to watch or listen for hardly distinguishable signals occurring at unpredictable intervals? The author has examined these problems scientifically, in order that some of the conditions essential for a high level of human performance may be based on precise information and not on vague ideas or speculation.

The report is divided into two parts, the first concerned with tests of vigilance, the second with the effects of environmental conditions upon performance at certain tasks.

In a number of operational situations a radar operator is required to observe the radar tube continuously in order to detect the presence of submarines. The specific problem was to ascertain whether these men were performing efficiently, or whether long uninterrupted periods of watch were liable to lead to the operator missing the signal in the radar tube. The apparatus used for testing consisted of a clock dial with a pointer. The tip of the pointer moved every second, and at long and irregular intervals it moved double the normal distance. Trained observers were seated in front of the dial and required to press a key whenever they saw the double movement. The number of occasions on which they failed to observe the double movement (the stimulus) was observed under varying conditions. These variations in conditions included the following: four continuous spells of half an hour; alternating spells of half-hour work and half-hour rest; two half-hour work spells followed by two half-hour rest periods; preceding the period of watch by special briefing; giving the subjects knowledge of success or failure; administration of benzedrine; and changes in the atmospheric conditions.

A somewhat similar set of experiments was carried out on a synthetic radar apparatus, and on another apparatus in which the stimulus was auditory instead of visual.

The main conclusions were of considerable practical importance though some could hardly be called surprising. After the first half-hour subjects missed substantially more signals, but by alternating half-hour periods of watch with half-hour periods of other work this decline could be avoided. When the subjects had knowledge of their success the deterioration was reduced and even a telephone message in the middle of the test