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Psychology and Industry.

DURING the last fifty years there has developed a much closer association between scientific research and productive industry than was formerly the case; as is well known, many firms now have excellently equipped laboratories, staffed by highly qualified scientific men and technicians, devoting the whole of their time to devising improvements in the means of production and in the commodity produced. These activities, however, are concerned primarily with the technical and mechanical aspects; hitherto much less attention has been paid to the human factor in industry and commerce. It is very encouraging, therefore, to learn from the ninth annual report¹ of the National Institute of Industrial Psychology, just issued, that large employers of labour are now recognising to an ever-increasing extent the value of the study of human 'behaviour' and 'endeavour', in relation to manufacturing processes and business organisation—that is, the application of psychology in the factory, workshop, and office.

This appreciation is by no means confined to the employers who benefit by increased production. The workpeople in the various establishments in which the Institute has conducted investigations have invariably extended their whole-hearted co-operation in the experimental work, and acknowledged the variety of advantages—lessening of strain, irritation, worry and boredom, and increase of earnings, etc.—derived from the adoption of the suggestions put forward by the industrial psychologist.

Merely to state that the purpose of the Institute is the application of the principles of psychology and physiology in industry and commerce, is to indicate at once the variety of problems with which it is concerned and the wide field to be covered. Members of the Institute's staff have been engaged in investigating the best methods of applying human energy in factories, offices, etc., especially in regard to the elimination of unnecessary movements, the most advantageous distribution of periods of rest and work, and the determination and realisation of other conditions which tend to the maximal health, comfort, and well-being of the worker. They have also been concerned in the planning of the lay-out of plant, the co-ordination of processes in production, and the reduction of monotony. There has been considerable develop-

¹ Obtainable from the Secretary to the Institute, Aldwych House, London, W.C.2.

ment in the application of suitable methods so as to secure more efficient and scientific selection of workers and enabling trustworthy guidance to be given to adolescents when choosing their life's work. The educational activities of the Institute include the provision of training courses for managers, foremen, investigators, etc., lectures for employers and workers, and the publication of the facts established by its research work.

The research work undertaken by the Institute, mainly by grants from the Rockefeller Trust, forms an important complement to the valuable researches carried out by the corresponding Government body, the Industrial Health Research Board, which is under the direction of the Medical Research Council. The Institute's investigations in the field are of course largely dependent on the knowledge derived from such research.

Industrial processes are so numerous, the conditions which obtain in factories, workshops, and commercial undertakings differ so much, and the types of workpeople and staffs are so varied, that only actual investigation in the establishments themselves can be expected to provide solutions to the many difficulties confronting the employers and the workers engaged in them. The best evidence of the value of these investigations is that firms which have engaged the Institute's services have given 'repeat orders' for the extension of the work to other departments of their businesses. Again, these investigations have been carried on in all kinds of industries, differing largely in their methods of organisation for production and distribution; but in all cases it has been possible, after a close examination of the situation by an expert in industrial psychology, to effect improvements in the conditions under which the operatives work or in the manufacturing processes and, generally, in both directions concurrently.

In the safety razor blade department of a cutlery factory, the Institute's investigator recommended the installation of various mechanical devices to limit non-productive time (which in certain processes occupied as much as 53 per cent of the working period) and to minimise waste. In 'piercing' alone, it was calculated that an annual saving of £200 would be effected on £2000 worth of material. The improved organisation in the polishing and stropping shops led to increases in output of 78 per cent and 23 per cent respectively. Rest pauses were introduced in the grinding shop with good results, and movement studies led to the devising of better working methods of grinding and polishing. Also, suggestions were

made for a new method of payment by progressive piece rates which would provide a more effective incentive to increased output.

Among many other investigations carried out during the year, the report mentions a spinning mill in which such varied subjects as illumination, analysis of sales and organising production with the view of reducing costs of manufacture, and planning of work ahead were considered; a fancy goods factory where an annual saving of £1400 will be effected by the reorganisation of the gangs working the presses; and a railway service for which the lay-out of the iron foundry in the locomotive works was re-planned, including the mechanisation of certain heavy operations resulting in the expenditure of less physical energy on the part of the workmen. The report also gives interesting details of investigations into such varied businesses as a gas works, a chemical works, a number of radio manufactures, telephone and cable factories, textile machinery, a departmental store, engineering works, offices, and the General Post Office. In all such investigations it not infrequently happens that the psychologist discovers factors which, although individually of apparently minor importance, have a cumulative detrimental effect upon the workers, with a consequential effect upon the nature and the amount of work performed.

The need for assistance to a boy or girl in the choice of a career on leaving school is becoming more and more recognised, and in its vocational guidance and selection departments the Institute has conducted a large amount of research work and shown the definite value of psychological tests. In 1922 it carried out a joint experiment with the Industrial Health Research Board. In 1924 it began an experiment on a larger scale in the course of which the careers of 1200 London boys and girls have been closely examined. Psychological tests were applied to 600, upon the results of which they were advised in the choice of an occupation; while the other 600 (regarded as a 'control' group) received the advice normally given by one of the Juvenile Advisory Committees of the Ministry of Labour.

This experiment has been made possible by grants from the Carnegie United Kingdom Trusts, by the co-operation of the London County Council in enabling the tests to be carried out during the pupil's last term at school, and by the Ministry of Labour in the finding of suitable employment for the boys and girls after leaving school. The completed results of this experiment are likely to

be published during this year, but the information already received indicates clearly that psychological examination with advice based upon scientific research must have in future a definite place in our system of vocational guidance and selection. Other experiments of this nature with which the Institute is closely concerned are being conducted in conjunction with the Birmingham Education Committee and with the Fife Education Authority.

This branch of the Institute's activity is not confined to school leavers. Similar work has been successfully accomplished in connexion with higher administrative posts in businesses and in the selection of overseers, foremen, etc., in manufacturing establishments. As a consequence of the introduction of these methods in a textile mill, the total labour turnover due to dismissals has fallen from 9.5 to 6.2 per cent since the adoption of the Institute's recommendations. A large engineering firm reports that it has definitely proved that "the test gives us within an hour the measure of the boy's suitability which it would take three to six months to obtain in the works under the control of a foreman".

The Institute, of which the late Earl of Balfour was president until his death, is to be congratulated upon a very successful year of work—work of national importance which affects the community in a variety of ways, all tending towards the improvement of the conditions in which we work and live. Its aim, like that of a hospital medical school, is to combine practice, training, and research. The cost of the factory investigations of the Institute is met by the fees paid by the employers; but large numbers of applicants for vocational guidance must be turned away owing to their inability to pay for its expense. Not only the vocational guidance work, but also the training and research sections of the Institute need endowment. Indeed, as the Prime Minister recently said at the annual dinner of the Institute, "If you were endowed with something like a million a year, you could spend it in such a way that not a farthing of your endowment would be wasted". The Institute now possesses laboratories, research rooms, a library, and a lecture room. It is performing services of unique national importance, welcomed by all classes of the nation. It is appealing for an endowment fund of £100,000 in order to set its work on a permanent footing; and we cordially commend the appeal to trusts and generous benefactors desirous of promoting close contacts between the material and human factors of progressive life.

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The Beginnings of Entomology.

Materialien zur Geschichte der Entomologie bis Linné.

Von Dr. F. S. Bodenheimer. Band 2. Pp. vi + 486 + 4 Tafeln. (Berlin: W. Junk, 1929.) 2 vols., 100s.

THE issue of the second volume of this important work has speedily followed the publication of the first (reviewed in NATURE for June 22, 1929). The present instalment, as exact and thorough in its treatment as its predecessor, gives evidence of immense industry on the part of the author, Dr. F. S. Bodenheimer. Continuing the subject of the study of insects during the seventeenth and eighteenth centuries, the volume before us opens with a section on applied or economic entomology, with especial reference to agriculture, sericulture, and bee-keeping.

The treatises on these departments that appeared from 1600 onwards were both numerous and bulky. Besides precepts of some practical benefit, they were apt to contain a large quantity of valueless matter. Much attention, however, was paid to the protection of orchard and garden produce from the ravages of caterpillars. The migrations and depredations of locusts, more important to European husbandry in former days than at present, are noticed by the author at some length; much recent literature on the subject is quoted, and the recent researches of Uvarov are referred to with approval. Interesting chronological tables are given of the occurrence of locust swarms in various countries of Europe. Under the head of noxious insects, the author takes occasion to commend the remarkable observations of the Englishman, Robert Southall, recorded in his "Treatise on Bugs" (1730), and to regret that his remedial measures have not met with more recognition.

An important section of the work is devoted to the subject of learned societies and academies. To the influence of these institutions the author rightly attributes the wide diffusion of the spirit of inquiry which took its rise about the middle of the seventeenth century. As those most deserving the attention of entomologists he enumerates the Royal Society of London, the Academy of Schweinfurth in Franconia, and the Paris Academy of Sciences. The first named of these societies is, as the author truly declares, of more importance in the history of entomology than any of the continental associations. But here, for once, we catch Dr. Bodenheimer tripping. Perhaps even an English reader might fail to recognise under the style of "Christophus Wien" the architect