

Dr. A. E. Trueman and Dr. J. Weir's extensive work on British Carboniferous Non-marine Lamellibranchiata. Mrs. E. M. Knox has continued her work on the spores in coal, Miss D. Elrich, at the University of Budapest, has investigated industrial conditions in Hungary, Mr. Gilfillan the social and economic development of Dumbartonshire in the nineteenth century, and Miss A. M. Keay a study of the Forfeited Estates Papers in H.M. Register House, Edinburgh, with the view of elucidating the effect of the policy of the Commissioners on the social and political organisation of the Highlands during the eighteenth century.

The report of the superintendent of the Laboratory of the Royal College of Physicians, Edinburgh, pays a tribute to the work of Lieut.-Colonel W. F. Harvey, who was in charge of the Histopathology Department for twenty years and whose death on September 11, 1948, was a great loss to the Laboratory. Research on the chemotherapy of cancer using transplantable tumours in mice continued, while in biochemistry the discovery of new chemotherapeutic agents was again a chief objective. Some *p*-phenanthroline compounds proved to have considerable action against avian malaria, and the preparation of chloro derivatives has been completed. Work has also continued on the synthesis of *p*-phenanthroline compounds containing two basic side-chains, and a number of benzthiazole derivatives, chiefly 6-nitro- and 6-amino-2-styryl derivatives, have been prepared for test for antifilarial activity. The synthesis of benzthiazole compounds has been the chief concern of Dr. J. E. McKail.

## CHEMOTHERAPY OF TUBERCULOSIS

THE fourth meeting of the Fine Chemicals Group of the Society of Chemical Industry was held at King's College, London, on January 18, with Sir Jack Drummond in the chair. A discussion on "The Approach to the Chemotherapy of Tuberculosis" was opened by papers by Dr. James Walker and Dr. F. D'Arcy Hart, both of the National Institute for Medical Research.

Dr. James Walker said that the limited knowledge of the metabolic processes of the tubercle bacillus has made an empirical approach to chemotherapy inevitable; but research has been aided by the use of wetting agents, such as 'Tween 80', and the addition of serum albumin to liquid media, which make it possible to obtain visible growths from minute inocula of the organism. Compounds at present under trial include the sulphones, which probably exert their action in the body by slow hydrolysis to diamino-diphenylsulphone; the diphenylamine *o*-carboxylic acids which act as antioxidants in certain biological oxidation mechanisms, and which have shown some inhibitory activity *in vitro*; and the di-alkylsuccinic acids and other substances with lipophilic terminal groups, which may aid penetration of the drugs into the lipid-rich bacillus. Various antibiotics have been tried against the tubercle bacillus, the best so far being streptomycin.

Dr. D'Arcy Hart said that sulphethrone and its analogue promizole, the least toxic of the sulphones, have produced some regression in the acute forms of human infection, and calciferol has brought about dramatic and consistent improvements in lupus

vulgaris. Streptomycin has proved life-saving in a proportion of cases of tuberculous meningitis and miliary tuberculosis, hitherto invariably fatal, and it is useful in less serious forms of the disease. Its clinical use is limited by its toxicity and by the drug resistance which develops in some patients under treatment. Lastly, *p*-aminosalicylic acid has shown promise and is under trial in Great Britain, both alone and in conjunction with streptomycin.

Much yet remains to be done; but chemotherapy has already given a new edge to the sword of established practice, and the time may not be far off when tuberculosis will cease to be the greatest destroyer of useful lives in Western civilization.

## CORRELATION OF EVOLUTION OF HOST AND ECTOPARASITE

UNDER the title "Fahrenholz's Rule in Ectoparasitism", Dr. W. Eichler, of Ascherleben, Germany, contributes an interesting paper to *The Annals and Magazine of Natural History*, Series 12, No. 8 (August 1948). It has long been known that the natural classification of some groups of animals of parasitic habits corresponds with that of their hosts. Since Fahrenholz was one of the chief protagonists of this rule (in regard to the Anoplura in particular), the author has named this general principle "Fahrenholz's Rule". It applies, for example, to certain groups of ectoparasites and their hosts. Fahrenholz argued that the ancestors of extant parasites must have been parasites of their original ancestral hosts, evolution of host and parasite consequently having gone on side by side. The conclusions drawn from the classification and relationships of many groups of parasites enable light to be thrown on the natural relationships of their hosts—even in cases where the latter show very divergent features from other members of their group.

One of the best examples of the working of this principle is in the case of the flamingo—a bird which is placed by some ornithologists among the ducks, whereas others relegate it to the storks. Those who think it to be a duck explain its long stork-like legs as convergence owing to similarity of habit. Others maintain that it is, in fact, merely an aberrant stork, whose duck-like bill is the result of convergence. The evidence afforded by the parasites of flamingoes strongly argues in favour of their derivation from those of ducks. Thus the bird lice show in the main a clear affinity with those living on the Anatidæ. The ostrich and rheas are only parasitized by bird lice and feather mites common to those birds. This evidence is also confirmed by the cestode and nematode parasites of those two groups of birds.

Szidat (1939) has shown in his studies of the life-cycles of Trematoda that primitive hosts are parasitized by primitive types of trematodes and specialized hosts by specialized parasites. He quotes the parasites of various vertebrates in support of his contention. In the trematode subfamily Asymphyliodorinae the hosts are fishes of the family Cyprinidæ, which have their developmental centre in East Asia. In this region some of these Trematoda occur among different genera of Cyprinidæ, but with the spread of these fishes to Europe the parasites become more specialized, with the result that they become restricted to a particular Cyprinid genus or, in one case, to a single species.

Dr. Eichler also explains what he calls the "divergence rule". Where there are groups of hosts with many species, he deduces the rule that the more a given host is infested by different genera of parasites the larger must be the group to which that host belongs. This principle is illustrated by many of the Mallophaga that infest large groups of closely related birds. The fact that the tinamon Mallophaga are very numerous in genera is exceptional for the parasites of a bird group containing so few species. It indicates, perhaps, that the Tinamidæ was a much larger group of birds at one time, most of its species having died out.

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## RESEARCH IN INDUSTRIAL RELATIONS

AT the 1948 mid-winter meeting of the American Philosophical Society, which was held at Philadelphia in February 1948, papers were read dealing with research frontiers in human relations.

One of these papers, by Prof. E. Wight Bakke, of Yale University, dealt with the subject of research into industrial relations and suggested that the search in recent years by leaders of management and labour for basic principles of human relations on which they might build new techniques in their own organisations has been in vain (*Proc. Amer. Phil. Soc.*, 92, No. 5; Nov. 12, 1948). According to Prof. Bakke the psychologists have come closest to providing the practical men with the most useful principles, and some of them have contributed by the development of tests for prospective employees, attitude surveys, techniques for building morale, training of supervisors, and similar projects. Other psychologists have also undertaken a careful analysis of the motives for and determinants of behaviour among workers themselves. Anthropologists, sociologists and economists, too, have carried out investigations; but these have been only loosely connected with the subject of industrial relations, and no common theory running through this research into human relations has emerged.

It is not surprising, therefore, that the leaders of management and labour have been unable to turn to a dependable and useful science of human relations. Neither is it surprising that the men of action have not been able to find what the men of science have been unable to find or produce, namely, an integrated body of principles of human behaviour on which the techniques for the organisation and direction of human beings in purposeful group activity could be tested and on the basis of which effective action could be developed.

In an attempt to determine the particular type of research into industrial relations in which the development of a scientific theory of human interaction and of the determinants of human behaviour would be the dominating consideration, Prof. Bakke insists that industrial relations are simply one kind of human relations. The principles which govern men's actions and relations in industry are no different basically from those which govern their social, their religious, their familial, their educational, and their political activity and relations. The distinguishing marks of this kind of industrial relations research would be:

(1) The general problem must be defined as one of learning the determinants of human action.

(2) Specific questions must be shaped by reference to the need for amplifying or modifying a basic theory of cause and effect.

(3) Group-wide or group-wise behaviour and the group as an organic entity must be emphasized.

(4) A diagnostic pattern outlining all personal and environmental facts needed for adequate explanations must be utilized.

(5) Attention must be paid to the definition and measurement of data in quantitative terms.

(6) Field observations must be used as the major source of data.

(7) Theory must be progressively formulated and tested in the laboratories of industrial and union operations.

This kind of research may be described as a 'frontier' activity primarily because it is seeking to develop systematic principles of cause and effect in a field of behaviour in which such principles are not understood. Here the most pressing need of to-day is for studies not only of personnel policies but also the nature of persons; not only of incentive systems but also of human incentives; not only of collective bargaining procedures but also of the factors which mould the actions and attitudes of the bargainers; not only of bargaining issues but also of the structures of living of the parties which give them varying and conflicting 'slants' on the issues; not only of the structure of management and unions, but also of the compulsions these structures impose upon the actions and thoughts of the men who represent them; not only of techniques for organising enterprises or unions, but also of the principles of effective association and group solidarity and teamwork.

This type of research raises many problems, in addition to the scientific problems of the research itself. It is expensive. The facts must be gathered through field-work of a comprehensive nature. The personnel who can collect the facts must have a breadth of training and knowledge preferably in more than one discipline. A further difficulty arises out of the necessity for a partnership of the men of science with the men of action, management and trade unionists, in the collecting of facts and the testing of conclusions. Even when co-operation is obtained, there is the necessity for accurate and full reporting of results which are not always easy to reconcile with the requirement for avoiding harm, actual or feared, to the co-operating organisations and individuals. There is also the necessity for using a language in describing scientific results which is understandable to men who are not trained in science.

In conclusion, Prof. Bakke describes the value of theory in the advancement of knowledge and its application to the solution of the world's industrial problems. The increase in quantity and quality of material goods which flow from industrial operations is as dependent on the effective co-ordination of people and efficient team-work as upon the adequacy of tools and technique. The processes of democratic society are seriously disturbed by industrial warfare. The practical decisions in ordering human relations so that the public interest may be met depend on the leaders of industry and unions. Changes in technology, in economic, social and political situations, are constantly inserting elements, of which the old techniques took no account, into the problem. Today, more than formerly, he is poorly equipped for adaptive action, in industry or elsewhere, who knows merely what to do but not why he does it.

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