CHEMICAL CONSTITUTION AND BIOLOGICAL ACTIVITY

PROGRESS in the interpretation of biological results in terms of chemical constitution is very slow. Except in chemotherapeutic investigations, attempts to correlate physical and chemical data with activity of animal tissues have proved disappointing. Even allowing for the relatively low degree of accuracy in biological methods and the too frequent absence of specific knowledge of the mode of action.

At the present time some advances have been made by using drugs belonging to a homologous series, or containing different elements but possessing varying degrees of similar pharmacological activity. Furthermore, lines of research have been directed with drugs having similar structures but showing protagonist and antagonist action. When Dr. F. Bergel delivered his address on "Some Aspects of the Relationship between Chemical Constitution and Physiological Activity" to the Fine Chemicals Group of the Society of Chemical Industry on November 26, 1948, at the London School of Hygiene and Tropical Medicine, he mentioned that too much must not be expected from one or two series of data disclosing only a fraction of the overall constitution. Once a working hypothesis of mechanism of action is established, correlation should be attempted between physico-chemical measurements and biological activities.

During the course of his address, Dr. Bergel showed that, in the consideration of the validity of the expression connecting physiological action of a drug and its chemical constitution (Crum-Brown and Fraser, 1869), it is necessary to include those events which precede visible pharmacological effects. The picture is confusing; but two working hypotheses help to elucidate the mechanism of drug action. In the first or receptor theory, certain areas of the cell at the site of action combine with the drug, and these combinations are the cause of the biological action. Many drugs such as anaesthetics, analgesics, and autonomic derivatives, acting rapidly and in high dilutions, may find their receptors on the outside of the cell surface, while those influencing cell division or growth may react with constituents of the protoplasm. Methylene blue, with its atropine-like and anti-bacterial effects, provides a clear example of both external and internal reactions. In the second or enzyme receptor theory (supported experimentally by such work on B.A.L., inhibitors of cholinesterases, respiratory enzyme systems, and amino-oxidases), a number of these receptors are said to be identical with functional enzymes or proteins. Then, on the basis of competitive affinity and mass action, an explanation is possible for the selective potency of stereoisomers, the increase of activity in homologous series, and the antagonistic action of certain drugs similar to protagonist molecules. The fact that low concentrations of many substances may produce physiological stimulation or depression while higher concentrations cause the reverse effect is, however, not easy to explain.

Turning to the chemical side, Dr. Bergel stressed that, only with models based on correct inter-atomic distances, van der Waals radii and valency angles, apart from geometrical and optical isomerism, can the compactness and spatial distribution of the atomic aggregate be appreciated. In addition, the

existence of electrovalent, covalent and co-ordinate bonds, lone electron pairs, bonds with dipole moments adding up to polar groups and to polarization of the molecule, oscillating dipoles, resonance and hydrogen bonding, must not be forgotten. It has already been shown in some series that a certain bond-distance appears to be optimal for maximal effects. But disappointing results have been obtained from other aspects, and pharmacological chemists have therefore had to rely on rather more empirical approaches. The aim has often been to find a pharmacodynamic group, that is, the structural minimum which still carries distinct activity, and this type of method is well illustrated by work on synthetic analgesics, such as morphine substitutes.

G. B. WEST

GERMAN SOCIETY FOR DOCUMENTATION CONFERENCE AT COLOGNE

BEFORE the Second World War, the International Federation for Documentation, then the International Institute of Documentation, included a German section which, afterwards, was converted into a purely German affair under the Nazi regime. A conference of the Deutsche Gesellschaft für Dokumentation took place in Salzburg in 1942.

During December 9-10, 1948, at Cologne, another conference was held, the first since the War, with the aim of finding the way back to the broader outlook which might once again open up possibilities of international co-operation in the field of documentation. It was a re-organised Deutsche Gesellschaft für Dokumentation which sponsored this Conference, together with the Deutsche Normenausschuss, the Verband der Bibliotheken von Nordrhein-Westfalen, the Arbeitsgemeinschaft der Technisch-Wissenschaftlichen Bibliotheken and the Verein Deutscher Archivare. The Conference was attended by some 150-200 delegates from different parts of Germany, representing universities, libraries, learned societies, the legal profession, designers of apparatus, and industrial bodies, meeting on board a middle-size river boat equipped as hotel and restaurant.

The opening session was presided over by Prof. Schmölders, who welcomed the delegates on behalf of the rector of the University of Cologne, Prof. Kroll. The main speakers of this session were Dr. Vollmer, director of the Staatsarchiv at Düsseldorf, and Prof. Corsten, director of the Stadt- und Universitätsbibliothek at Cologne. It was followed by a business meeting of the newly constituted society, election of officers, the formation of sub-committees and so on. Lectures, open to the public, were given at the University of Cologne by Dr. W. Schürmeyer, president of the Deutsche Gesellschaft, Mrs. L. Moholy, representing the Library Association and the Royal Photographic Society of Great Britain, and Dr. Pierre Bourgeois, director of the Bibliothèque Nationale Suisse.

The emphasis of the lectures, papers and subsequent discussions was on the various aspects of microphotography, its growth and development, its progress in different countries, its use in archives, libraries and bibliographical centres, its importance for scholars, scientific and research workers, the copyright position, and so on. Two copyright experts, Dr. O. Runge and Dr. Wildt,

advocated the setting up of central agencies to simplify procedure (a suggestion also recommended in Great Britain), especially in cases where speed is essential. Prof. E. Reimer, another authority on the subject, was unable to attend.

To some extent the problems attached to the use of microfilms in Germany have been similar to those in Great Britain, though where the British often hesitate, the Germans have made quick decisions, and a variety of answers now strive for co-ordination. The requirements of *ad hoc* copying are distinct from those which govern organised reproduction; but any solution must keep within the provisions of a restricted economy. There seems to be scope for transparent as well as opaque material, flat shapes as well as long lengths, celluloid and 'Cellophane', high- and low-reduction ratio, microfilm with or without perforations, microcards, miniature prints, and so on, with the limitations mainly imposed by dearth of machinery.

To keep in check and, if possible, to standardize the existing variety of experimental methods, were among the aims the Conference set out to achieve. Apparatus, material and samples of work done were on view, to give practical backing to a number of technical points. It was, however, realized in the course of discussions that account must be taken of corresponding efforts carried on outside Germany, if international co-operation is to be restored, this being the other objective foremost in the minds of those who organised the Conference. The presence of foreign guests, including Mr. Donker Duyvis, general secretary of the International Federation for Documentation, to whom the Deutsche Gesellschaft für Dokumentation has now applied for re-affiliation, was welcomed as a hopeful sign in this direction.

L. MOHOLY

PHYSICS IN GERMANY

A DISCUSSION about the claims of technical physics to be regarded as a subject in its own right began at the International Congress for the Training of Engineers in Darmstadt in 1947, and has been carried on in *Physikalische Blätter* (No. 8, 253; 1947. No. 1, 16; 1948. No. 3, 110; 1948), and is still going on.

Prof. C. Ramsauer, an eminent 'technical physicist' himself, founder and director of the A.E.G. Research Station, is emphatically opposed to the idea of technical physics as a special subject, although formerly there was a society devoted to it of which Prof. Ramsauer was president. Prof. Ramsauer states that during the First World War, both industrial and Government authorities were surprised at the superiority of 'pure physicists' over engineers in the solution of technical problems. Soon it was generally recognized that where new ground is to be tilled, it is not the routine of the engineer but the comprehensive grasp of fundamentals that assures success. The teaching of engineers, he believes, should be the same as that of all other physicists, supplemented in the advanced stages by technical courses not occupying more than one third of the total time, this total excluding mathematics and chemistry but including physical chemistry. The most grievous injury inflicted on German science by the Nazi regime was the substitution of the diploma examination for the doctor's dissertation; an

examination deals with present knowledge whereas the thesis teaches the student to explore the unknown.

The opposite view has been advocated by Prof. Vieweg. He maintains that 'technical physics' must be a separate subject from the start. The technical physicist is a liaison officer between physics and engineering. Prof. Vieweg believes there should be mutual fertilization, and the term 'technical physics' expresses better than 'applied physics' this reciprocity. The task of technical physics is to loosen up and prepare the ground for technical development.

Prof. Ramsauer, after quoting replies to a questionnaire, most of which share his view, invites university authorities and industrial leaders to express their opinion about some concrete proposals which he sets forth. These include the demands that the term 'technical physics' should be completely dropped and that, as before, the doctor's degree should be the natural goal of every physicist's training. He calls this a matter of life and death for German science.

The Deutsche Physikalische Gesellschaft in der britischen Zone has declared at its board meeting of September 8, 1948, that it adopts the views of Prof. Ramsauer. It is of the opinion that there is no 'technical' physics, but only physics; technical physics is nothing but the application of pure physics to technical problems, and no special syllabus is required for such purposes. The Society considers that the introduction to technical mechanics and into electrotechnics should be taught at universities. Special technical problems ought to be dealt with in accordance with local conditions; however, they must not endanger the thoroughness of the general scientific education.

The obligatory doctor's dissertation is regarded as most important; its abolition during the Nazi regime was a great misfortune. The Society is most anxious that the 'diploma examination' should again be replaced by the 'doctorate examination'. In the meantime, it requests all authorities and firms to give preference to candidates who have obtained the doctor's degree. Gratification was expressed at the board meeting that its views are approved by the most important industrial firms.

FORTHCOMING EVENTS

(Meetings marked with an asterisk * are open to the public)

Saturday, February 19

INSTITUTE OF PHYSICS, INDUSTRIAL RADIOLOGY GROUP (at 47 Belgrave Square, London, S.W.1), at 10 a.m.—Discussion on "Layout and Planning for Radiographic Inspection".

Monday, February 21

UNIVERSITY OF LONDON (at King's College, Strand, London, W.C.2), at 5.30 p.m.—Dr. H. G. Thornton, F.R.S.: "The Ecology of Bacteria with Especial Reference to Soil".* (Further Lectures on February 28 and March 14.)

ROYAL SOCIETY OF ARTS (at John Adam Street, Adelphi, London, W.C.2), at 8 p.m.—Dr. W. H. J. Vernon: "The Corrosion of Metals". (Cantor Lectures.) (Further Lecture on February 28.)

ROYAL GEOGRAPHICAL SOCIETY (joint meeting with the ROYAL SOCIETY, at Kensington Gore, London, S.W.7), at 8.15 p.m.—Prof. Hans Pettersson: "Exploring the Ocean Bed".

Tuesday, February 22

ROYAL ANTHROPOLOGICAL INSTITUTE (at 21 Bedford Square, London, W.C.1), at 5 p.m.—Mr. W. G. Archer: "Primitive Indian Pottery".

INSTITUTE OF SOCIOLOGY (at the Royal Institute of British Architects, Portland Place, London, W.1), at 5.30 p.m.—Dr. G. Scott-Williamson: "The Family as a Basis of Society".

INSTITUTION OF ELECTRICAL ENGINEERS, MEASUREMENTS SECTION (at Savoy Place, Victoria Embankment, London, W.C.2), at 5.30 p.m.—Discussion on "Automatic Precision Instruments" (to be opened by Dr. A. T. Starr).