Alexander). Similarly, irradiated dry polymers can initiate polymerization in their own or different monomer solutions, even months after the exposure, thereby forming so-called graft polymers. These show a mixture of the physical properties of the parent substances (A. Chapiro; M. Magat). The reactions of diphenylpicryl hydrazine have been studied in great detail, showing that substitution occurs in the *p*-position of the phenyl groups (A. Henglein; W. Wild). Irradiated solutions of diphenylpicryl hydrazine show an after-effect lasting for several weeks. Some discrepancies between the experiments with this substance in Britain, France and Germany seem to have been due to differences in analytical procedures and conditions of irradiation (W. Wild; A. Chapiro; A. Henglein). The loss of colour of diphenylpicryl hydrazine, irradiated in mixtures of organic solvents, does not follow a simple additive law, indicating energy transfer from one solvent molecule to the other (A. Chapiro; S. S. Medvedev). Similar evidence of a non-additive effect has been observed in the luminescence of *p*-terphenyl induced by γ -irradiation in mixtures of benzene and cyclohexane (M. Burton, P. J. Berry and S. Lipsky). The use of radiation as an energy source in preparatory organic chemistry was demonstrated in halogenation reactions of aromatic compounds and in the synthesis of methylene blue and other organic substances (D. E. Harmer, J. J. Martin and L. Anderson; J. Loiseleur).

Many of those who attended both this meeting and the Faraday Society Discussion on radiation chemistry in Leeds in 1952 felt that in Paris there was less controversy about possible radical intermediates, most of the new results falling into line with accepted schemes of radical formation and reaction. Even the concept of the 'molecular yield' which has had considerable prominence showed signs of giving way to interpretation in terms of these schemes.

M. EBERT
P. HOWARD-FLANDERS

POLAROGRAPHIC INSTRUMENTATION

FIRST SYMPOSIUM OF THE POLAROGRAPHIC SOCIETY

BY invitation of Prof. F. S. Dainton, the first symposium of the Polarographic Society was held in the Chemistry Department of the University of Leeds on May 25. In its emphasis on the design of polarographic instruments, this meeting is believed to have been the first of its kind to be held in Great Britain. After Prof. Dainton had extended a welcome to the Society, the chairman mentioned the steps leading to its recent formation and briefly outlined its objects.

In most cases, those reading papers explained the essential principles of the circuits employed in their instruments. C. Wontner described a simple manual polarograph and demonstrated its use in obtaining current/voltage curves. These can be plotted with surprising speed because of the semi-automatic location of the voltage scale in a series of 10-mV. steps. By virtue of a magic-eye null-point detector, the manual polarograph described by G. O. Jolliffe measures the true maximum current and so eliminates assumptions about the detector's equation of motion.

This instrument is also of interest to the polarographic research worker in that it contains facilities for measuring both current and voltage potentiometrically.

A pen-recording polarograph, which possesses a photovoltaic amplifier of very short time-constant, was described by E. A. Wood and Mrs. B. Lamb. The design of an associated condenser/resistance differentiating unit for use in derivative polarography was also explained. G. L. Young dealt with a pen-recording instrument involving a different type of amplifier and paid special attention to the theoretical aspects of an attachment which enables the instrument to record true derivative peaks by the a.c. polarographic method of Breyer and Gutmann.

After dealing with the rather differently shaped waves encountered in cathode-ray polarography, G. F. Reynolds gave an outline of the theory by explaining the equations of Randles and Seveik. Apart from being more sensitive than conventional instruments, the Chemical Inspectorate, Randles-type, single-sweep polarograph can also be operated with greater speed and simplicity. In its resolution of closely spaced steps and compensation for a preceding step, the instrument's normal performance is between that of the 'conventional' and the 'derivative' polarograph. However, the incorporation of a derivative circuit enables it where necessary to achieve the resolution of the derivative polarograph together with a much greater sensitivity. Mr. Reynolds expressed the view that, in general, the sensitivity and applicability of the cathode-ray polarograph are equal to that of the square-wave polarograph at its present stage of development. The design principles of a single-sweep cathode-ray polarograph were then given by H. W. Rowe-Leete, who also dealt with the electronics in terms of block diagrams.

By way of a contrast to these purely instrumental contributions, Mrs. N. Luthy read a paper on the application of the polarograph to pyrimidine chemistry, with particular reference to the detection of the —S—S— bond.

A. L. GLENN

LIBRARY RESOURCES IN THE MANCHESTER AREA

A CONFERENCE on library resources for industry and commerce in the Manchester area was held in Manchester on March 10 by the Northern Branch of Aslib. The speakers were Mr. D. I. Colley, Manchester City librarian; Mr. V. D. Freedland, information officer of the British Hat and Allied Feltmakers Research Association; Mr. L. L. Arden, librarian of the Manchester College of Technology; and Mr. R. Brightman, bibliographer of the Dyestuffs Division, Imperial Chemical Industries, Ltd.

In his survey of the services provided by the City Library, Mr. Colley emphasized their diversity. The main point is that these services have to meet the varied need of the rate-payers who pay for them. The commercial and technical libraries, while important and highly developed, are but two sections. This dependence on local finance necessarily limits developments. This is unfortunate, he said, because a census taken during 1954 showed that some 40 per cent of the users of the reference libraries were not rate-payers. Moreover, an analysis of this 40 per cent showed that Manchester is not only providing a

regional service but also a national, even international, one. In these circumstances, Mr. Colley maintained, it does not seem unreasonable to seek national support.

The major part of Mr. Freedland's paper consisted of an analysis of the holdings of some forty special libraries situated within a radius of twenty miles of the centre of Manchester. It was based on some of the replies to a questionnaire issued by Mr. A. L. Smyth, of the Reference and Special Libraries (North-west Group) of the Library Association. For convenience of presentation, Mr. Freedland grouped them under broad headings such as chemical production, textiles, engineering and the production and distribution of fuel and power. There are, he regretted, certain libraries which he was unable to include in his survey as they appeared to pursue a policy of non-co-operation in any of the various schemes for mutual assistance and collaboration.

Mr. Ardern spoke on the Manchester College of Technology Library and its assistance to industry. It began in 1824 as the library of the Manchester Mechanics Institute, and it still has many hundreds of the original volumes, of particular interest being the collection which had belonged to J. P. Joule. A few weeks ago the draft of a twelve-page letter which Joule had written in 1853 to William Hopkins, the Cambridge scientist, was found in one of these books. One of Joule's note-books, which was not recorded when Dr. Lowery described them in 1931, is in the library.

The library carries a stock of forty thousand volumes, five hundred current periodicals and the theses awarded for the degree of master of technical science in the University of Manchester. A large collection of standards is maintained, including those of the American Society for Testing Materials, the Society of Automotive Engineers and the Society of Plastics Industry. Many loans are made to industry, and the library will continue to welcome inquiries.

Mr. Brightman addressed the meeting as a library user. The public library, he thought, will be most useful to the firm which already possesses its own information service, and its chief value is in meeting marginal needs. Such a service can only be given if the public library does not fall below a minimum size. By co-operation, industry expands the public library service, and this implies development upon a regional basis. But it is not possible wisely to plan regional developments without regard to the national library system as a whole. The Royal Society's Scientific Information Conference in 1948 urged the Government to give increased support to central scientific libraries and stressed the need for co-operation in local areas. The Advisory Council on Scientific Policy appointed its own Scientific and Technical Information Committee, which reported on the needs of a national library of science and inventions, and plans for a new science centre were approved in principle by the Government in 1950. In December 1952, however, the Minister of Works announced the postponement of the whole scheme—even its planning. Apart from a protest in *Nature* and by Dr. Colgate in his Armstrong Memorial Lecture, this decision was unchallenged.

Last year, however, the Advisory Council expressed the hope that steps would be taken without undue delay to implement the scheme, and endorsed a report by its standing committee that there is a need for a new science lending-library outside London, preferably in a place easily accessible to the industrial areas of the North and Midlands, and that this library should be the centre of a regional loan system based

on selected municipal libraries. It is understood that the Government is now considering this.

The discussion which followed the four papers concentrated on the possibilities of achieving closer co-operation between local libraries and on the ways of bringing pressure on the Government to proceed with the science centre. The Northern Branch Committee was urged to take the matter up.

A. R. CAMERON

RADIO COMMUNICATION BY WAVE SCATTERING

IT has been known for some twenty years or more that in addition to the normal process of reflexion at the various regions of the ionosphere, by means of which most long-distance communication is conducted, radio waves could be scattered in various directions from the point of incidence on the ionosphere. Such scattered radiation is usually very weak and not easily detected by normal methods of reception. In 1952, however, a paper was published by a group of workers in the United States describing experiments conducted on a frequency of 49.8 Mc./s., during which easily measurable signals were obtained over an experimental path 1,245 km. long. While the strength of the observed signals passed through a maximum at about midday and a minimum at about 20 hr., there was no failure over a period of several months resulting from conditions in the scattering medium.

The success of such experimental transmissions relied on the concentration of the emitted radiation into a narrow beam directed at the correct angle to secure forward scattering from irregularities in the lower regions of the ionosphere. A narrow-angle receiving aerial was also used, directed so as to ensure maximum reception from the same portion of the ionosphere as was 'illuminated' by the radiation from the transmitter. Much interest was aroused by these and later experiments, which clearly offered the possibilities of opening up new channels in the very high frequency band between 30 and 100 Mc./s. for a limited range of distances between about 800 and 2,000 km.

While it has been known that further investigations were in progress in the United States, Canada and the United Kingdom, very little of the scientific or practical results obtained has so far been published. It is therefore of considerable interest to note the recent announcement by the Massachusetts Institute of Technology of the development of new methods of sending radio waves over useful distances for communications as a result of research conducted for the United States Air Force. Dr. W. H. Radford, head of the M.I.T. Lincoln Laboratory's communications division, is reported in *The Times* of July 18 to have said that the first application of these new systems would be in connexion with the defence of the United States and Canada. The use of very high frequency ionospheric scattering as referred to above is of particular advantage in high-latitude and arctic regions, where conditions in the ionosphere for normal high-frequency (30 Mc./s. and below) propagation are subject to storms, resulting in great variability and interruption of radio communications. It is understood that some circuits operating on these principles and using teletype transmission are already in operation.