

two instruments which have proved most popular are the yarn speed indicator and the loom setting indicator.

The Association runs a very active member service section, which provides literature and patent surveys, examines and reports on defective fabrics, and gives immediate assistance on factory production difficulties.

The staff numbers 260, made up as follows: research staff, 86; laboratory and technological assistants, 82; engineering, drawing office, and maintenance staff, 55; and library and administrative staff, 37. The Association has just agreed to the new terms of grant for the next five-year period, under which the industry is to subscribe £270,000 a year, against a grant from the Department of Scientific and Industrial Research of £90,000 a year, although the expenditure, which for the current year is to be £322,000, will not build up to £360,000 until the end of the five-year period.

POLYMERS, BIOCOLLOIDS AND POLYELECTROLYTES

SYMPOSIUM IN ISRAEL

UNDER the title of "Polymers, Biocolloids and Polyelectrolytes in Solution" an International Symposium on Macromolecular Chemistry was held in Israel during April 3-9 under the auspices of the Commission on Macromolecules of the International Union of Pure and Applied Chemistry and the Weizmann Institute of Science, Rehovot. This was the first time that such a symposium had been held outside America or Western Europe, and the efficiency of the arrangements and success of the meeting completely justified the choice. More than a hundred foreign scientists attended, including delegates from the U.S.S.R. and Eastern European countries, in addition to an Israeli group of the same size. Sessions were held in the Weizmann Institute, the new campus of the Hebrew University of Jerusalem, and the Institute of Technology at Haifa. It is typical of the rate of development in Israel that meetings in all three centres were held in auditoria that had been completed only recently.

In addition to eighty papers, lectures summarizing recent developments in polymerization were given. The topics discussed were the Ziegler-type polymerization of olefines (Mark, of New York), organic reactions of vinyl polymers (Smets, of Louvain) and the effect of high-energy radiation on vinyl monomers and polymers (Magat, of Paris). More specialized lectures were also given at the start of every session. Space permits no more than a mention of most of the papers that were presented, and for the same reason it is impossible in some cases to give all the authors' names.

The first section of the symposium dealt with the general behaviour of polymers in solution, and included lectures on the statistical thermodynamics of polymers (Prigogine, of Brussels), hydrodynamic properties of polymer solutions (Hermans, of Leyden) and a hydrodynamic study of sedimentation and diffusion (de Groot, of Leyden). Calculations have been made of the molecular extensions of polysaccharides and polybutadienes (Eliezer and Hayman, of Jerusalem), and the matrix method employed in the theory

of ferromagnetism has been shown to be useful in statistical problems involving polymers (Hill, of Bethesda). Departures from random mixing in polymer-liquid systems were considered by Gee (Manchester), and Rinfret (Montreal) summarized his recent accurate measurements of heats of mixing and partial specific volumes of polymer solutions, both of which show discontinuities that are dependent on molecular weight. Studies of the viscosity (Rempp, of Strasbourg) and vapour pressure and heat of dilution (Banderet, of Mulhouse) of solutions of paraffins and simple derivatives have been made. Interaction between solvents and cellulose derivatives (Moore, of Bradford) or nylon 66 (Valentine, of Leeds) has been measured by various techniques. Staverman (Delft) described an osmometer the 'membrane' of which is a vapour slit between two disks of sintered glass, and experiments in which diffusion through a conventional membrane was measured. The velocity of dissolution of polystyrene has been shown to depend on the molecular weight and can, after standardization, be used for measuring molecular weights (Ueberreiter, of Berlin). Studies on viscosity included the effect of shear (Eisenberg, of Rehovot) or capillary size (Lifson, of Rehovot) and the anti-thixotropy shown by solutions of polyisobutylene in tetralin (Crane and Schiffer, of Haifa).

Optical and electro-optical investigations were described in several papers by Cerf, Leray and Wippler (Strasbourg), Janeschitz-Kriegl (Delft), Peterlin (Ljubljana), Tsvetkov (Leningrad) and in a lecture by Sadron (Strasbourg). The present increased interest in the dielectric properties of solutions of polymers was reflected by papers by van Beek and Hermans (Leyden), de Brouckère (Brussels), Marchal and Benoit (Strasbourg) and Mandel (Brussels). For high degrees of polymerization, the root-mean-square dipole moment is found to be proportional to the square root of the degree of polymerization.

Several papers dealt with the solution behaviour of highly polar polymers. Morawetz (New York) stressed the importance of local concentrations in the molecular coil in determining the formation of association complexes. Viscosimetric and turbidimetric studies suggest that polymethacrylic acid is strongly intra-molecularly bonded, and that this may be responsible for its negative thixotropy (Eliassaf, Silberberg and A. Katchalsky, of Rehovot). The solution behaviour of chemically synthesized, branched polyglucoses (Mora, of Oxford) and the coacervation of polyamides (Turska, of Lodz) were also discussed.

As might be expected from the strong interest of Israeli scientists in this field, the behaviour of biocolloids and polyelectrolytes in aqueous solution was thoroughly discussed. Fuoss (New Haven) initiated the session with a lecture, and papers on theoretical aspects were presented by Oosawa (Nagoya), Lifson (Rehovot) and Michaeli and Overbeek (Utrecht). Topics discussed included the effect of the size of gegen-ions (Gregor, of New York) and the distance between ionizing groups (Dobry-Duclaux, of Paris). The experimental determination of the charge on the polymethacrylate ion was discussed by Jordan (Adelaide), and a new simple theory of polyelectrolytes which leads to good agreement between experiments on velocity of migration, conductivity and activity was presented by Dobry-Duclaux. Other polyelectrolytes that were discussed were polyvinylamine hydrobromide and polyvinylpiperidine (A. Katchalsky), vinyl amphoteric polyelectrolytes (Alfrey

and Pinner, of New York), lithium polyphosphate (Saini, of Turin), polymethacrylic acid (Kryszewski, of Torun, Poland), sodium alginate (Allgen, of Stockholm) and the sulphate of aminoacetalized polyvinyl alcohol (Matsumoto, of Okayama). The electroviscous effect shown by rigid polyelectrolytes (Donnet, of Mulhouse), the interaction of ionized polyelectrolytes with polarized mercury-water interfaces (Miller, of Rehovot) and the potentiometry of polyelectrolyte gels (Michaeli and A. Katchalsky, of Rehovot) were also discussed. The unequal permeability to different ions of hydrophilic membranes impregnated with polyelectrolytes, particularly the copper ferrocyanide and sulphuric acid/Cellophane/barium hydroxide membranes, was studied by Hirsch-Ayalon (Utrecht).

In the field of protein and polypeptide chemistry, two papers on the surface chemistry of synthetic polypeptides (Isemura, of Osaka) and gliadin and zein (Jaffe, of Brussels) were presented. The deuterium exchange of poly-DL-alanine with water suggests that it exists in aqueous solution in a folded, possibly helical form (Berger and Linderström-Lang, of Copenhagen), while a reversible transformation between helix and random coil has been found for solutions of poly-L-glutamic acid (Doty, of Harvard; Blout, of Boston). A general review of the solution behaviour of poly- α -amino-acids was given by E. Katchalsky (Rehovot), and the reversible heat coagulation of some of these was described by Noguchi (Kanazawa). Polybases (for example, polylysine) agglutinate red blood cells, altering their surface potentials (Nevo, de Vries and A. Katchalsky, of Israel), Meyer (New York) reviewed recent developments in our knowledge of the structure of connective tissue, and other proteins investigated were bovine serum albumin (Champagne, of Strasbourg) and actomyosin (Wassermann, of London).

Nucleic acids were also discussed in several papers and in two lectures by Jordan (Adelaide) and Watson (Cambridge, Mass.). These polymers have been investigated by a variety of physico-chemical techniques: for example, the ultra-centrifuge (Shooter and Butler, of London; Desreux, of Liège), light-scattering (Pouyet and Weill, of Strasbourg), streaming birefringence (Wahl, of Paris; Mathieson, of Nottingham), electrophoresis (Mathieson) and titration (Peacocke, of Birmingham; Mathieson).

Carbohydrates also received some attention. In a most interesting paper, Usmanov (Tashkent) discussed the physico-chemical behaviour of native cellulose and showed that the molecular weight increases steadily as the cotton fibre becomes older, so that the biosynthesis of cotton is apparently a polycondensation process. Spectroscopic studies of the ageing of starch were described by Samec (Ljubljana), while other carbohydrates investigated were levan, a polymer of D-fructose (Feingold and Gehatia, of Israel) and the cycloglucans (Freudenberg, of Heidelberg). Although cupriethylene diamine and cuprammonium hydroxide can be used as solvents in the molecular fractionation of cellulose, they are not recommended because of the degradation that may occur (Sihtola, of Helsinki). Theoretical aspects of polydispersity were considered by Hultin (Stockholm) and Daune (Strasbourg). The swelling of regenerated cellulose (Nowakowski, of Lodz), the sorption and diffusion of organic vapours by ethyl cellulose (Barrer and Barrie, of London) and adsorption on glass-like polymers (Kargin, of Moscow) were also investigated. The flexibility in solution of molecules

of hyaluronic acid was reported by Rowen (Los Angeles).

Miscellaneous studies on vinyl polymers included the effect of branching on the solution properties of polyethylene (Trementozzi, of Springfield, Mass.; Mussa, of Turin), the irradiation of polymers in solution (Charlesby and Alexander, of England), the swelling of graft copolymers of acrylonitrile on polyethylene (Chapiro, of Paris) and the preparation of various graft copolymers (Mesrobian, of Brooklyn). Finally, the preparation and properties of several nitrogen-containing polymers were described: for example, polyaminocarboxylic acids and polyvinylamides (Smets, of Louvain) and poly-N-vinylpyrrolidone (Breitenbach, of Vienna).

It is to be hoped that this highly compressed survey gives some idea of the tremendous variety of topics discussed. This catholicity was deliberate, as one of the objects of the organizers was to bring together workers on biocolloids and synthetic polymers so that cross-fertilization of ideas could take place. Judging by the animated discussions that took place inside and, to an even greater extent, outside the lecture halls, this aim was fulfilled. All the papers, together with the discussions, will be printed in full in a special issue of the *Journal of Polymer Science*.

L. VALENTINE

PROGRESS IN THE STUDY OF THE BRITISH FLORA

KNOWLEDGE of the British flora has advanced during the past decade at a rate which has never been equalled before. New techniques and a fresh approach to old problems have resulted in rapidly increasing progress, and the present is therefore an appropriate time for review of old and new methods with the object of suggesting the most fruitful lines for future development. This was the purpose of the conference arranged by the Botanical Society of the British Isles under the title of "Progress in the Study of the British Flora", which was held in Bedford College, London, during April 13-14.

The conference was opened by Prof. T. G. Tutin (University College, Leicester), who directed attention to the importance of learning to regard the flora of the British Isles as a small part of that of Europe. The insularity of British workers has not yet been entirely broken down, and a wider view can have important consequences for the future progress in the study of the British flora. To know their flora properly, British workers must enlarge their scope, and a start in this direction has already been made by experimental taxonomists and specialists in certain genera. Prof. Tutin suggested that the Society could play a valuable part in helping workers to take this wider view, and this proposal was enthusiastically supported by later speakers.

Most of the first day was devoted to consideration of old methods. Canon C. E. Raven discussed "The Early Development of a Knowledge of the British Flora". He pointed out that William Turner, the 'Father' of English botany, had little success in his efforts to identify English plants in the classical botany books until he travelled abroad. As soon as he came across the dried herbaria of Luca Ghini and the admirable pictures in Brunfels, his task became manageable. The discipline which this primary business of nomenclature involved was an exacting,