

totipotency and variation in cultured plant cells (Prof. F. C. Steward). In this way these four foreign delegates presented to the symposium a broad picture of work in their respective fields and laboratories. This was further supplemented by two films in sound and colour, which had previously been recorded by Prof. F. C. Steward, and were shown under titles of "The Requirements for Growth in Plants" and "Growth and Development of Plants".

The remaining papers fell into four main groups: (1) nine papers dealt with the culture of reproductive organs such as the nucellus (as in citrus), embryos, ovules, ovaries, flowers or pieces of inflorescence; (2) four papers on the culture of cryptogams, particularly fern gametophytes, the thalli of *Marchantia*, and on the culture of a moss (*Physcomitrium coorgense*); (3) four papers on the culture, mostly the technique of culture, of grown gall tumour tissue from the hollyhock (*Althaea rosea*); (4) four papers dealing with aspects of morphogenesis in tissue cultures of horseradish (*Armoracia lapathifolia*), of carrot root (*Daucus carota*), in orchid seedlings, and in *Bryophyllum*.

The conference drew heavily on the wealth of experimental morphological material which was available in the Department of Botany at Delhi, through the work of students working largely under the direction of Prof. P. Maheshwari and Dr. B. M. Johri as well as of other members of the Delhi staff. This Department, already well known for its contributions to plant morphology, has turned increasingly in recent years to an experimental approach to morphological problems. The visitors to the conference were impressed with the range of interesting plant material under investigation by these means, especially the examples of the culture of nucellus, ovules, ovaries, etc., and of other parts of the reproductive system. It is a healthy sign for plant morphology, and one from which physiology will also profit, that those already well trained in morphology

are now bringing their skills to bear on the culture of selected and interesting plant parts. The published volume that will recount these various investigations may thus be anticipated as one which will significantly advance knowledge in this field. The hope also is that the conference will have stimulated interest in this subject in South-East Asia, even as it furnished the foreign delegates with a valued opportunity to see what is going on in India.

In fact, at the end of the Delhi symposium, Dr. Nitsch and Profs. Reinert, Steward, and Street went to the Indian Science Congress, held at Cuttack, where they were again received as foreign delegates and guests of the Congress. Dr. Nitsch and Profs. Street and Steward delivered special lectures to the Indian Science Congress on topics similar to those presented to the Delhi symposium; Prof. Steward also addressed the annual meeting of the Indian Society of Biological Chemists, on the "Soluble Nitrogen Compounds of Plants", and Profs. Street and Steward participated with the Indian Society of Plant Physiologists in a meeting specially devoted to honouring Prof. F. G. Gregory, whose recent death was especially regretted in India where there are so many plant physiologists who were trained by him.

The foreign delegates especially are deeply grateful to the University of Delhi, to Unesco, and to the organizers of the Indian Science Congress for the opportunity to present an account of their own work and also to understand more about the range of experimental botanical work in progress in the various centres which they were able to visit. This left an impression of experimental plant morphology as a thriving branch of experimental science, which poses unique problems of growth and development for botanists to solve. In doing this work, classically trained morphologists and biochemically trained physiologists can now usefully combine forces and so benefit their respective disciplines.

F. C. STEWARD

## TEXTILE RESEARCH AND COLOUR CHEMISTRY AT LEEDS

THE eighty-fifth and eighty-sixth reports of the Advisory Committee on Textile Industries and Colour Chemistry and Dyeing in the University of Leeds to the Worshipful Company of Clothworkers, covering the sessions 1958-59 and 1959-60, record considerable progress\*. In the Department of Textile Industries the number of students remained about 400, but in 1958-59 extra-mural activities were an outstanding feature. In textile physics considerable progress was made in electron microscopic studies of various fibres. The uranyl group has been found to give selective staining of the endo-cuticle, and it has also been shown that two intercellular layers of the cell-membrane complex are attacked by keratinolytic reagents and enzymes. The structural changes brought out by variations in the conditions under which filaments of polyacrylonitrile are spun have also been studied.

In textile chemistry, cross-linking and polymerization reactions continued to receive much attention.

The physical properties of wool fibres (elastic modulus, swelling ratio) have been correlated with theoretical predictions. It has also been shown that an oxidized and alkali-treated wool fibre shows reversible spontaneous contraction and extension as the pH of an ambient aqueous solution is altered, the thermodynamic and X-ray diffraction results corresponding closely to those observed with muscle preparations. New methods of forming anchored and unanchored polymers on and in wool fibres have been evolved, and promising results have been obtained with insoluble organic pigments in the low-temperature, solvent-assisted method of dyeing. The constitution of suint has been established as essentially a polymerized dihydroxyphenol carrying a long-chain acid which can form peptide links with amino-compounds. The heat, free energy and entropy of sorption of methacrylic acid from aqueous solution by nylon have been determined, and the polymerization of methacrylic acid in nylon and the properties of nylon fabrics containing this polymer are being examined. The thermodynamic functions of  $\beta$ -keratose fibres are being examined and also the setting properties of wool, and the plasticity of wool has been related inversely to the sulphur content of the  $\beta$ -keratose

\* Reports to the Worshipful Company of Clothworkers of the City of London of the Advisory Committee on the Departments of Textile Industries and Colour Chemistry and Dyeing in the University of Leeds. Session 1958-59: Pp. 50; Session 1959-60: Pp. 52. (Leeds: The University.)

obtained from the oxidized fibres. The principles underlying the use of tetrakis (hydroxymethyl) phosphonium chloride in flame-proofing wool have been examined, and it has been found that presence of this substance enhances the ability of fibres to take a set in aqueous media.

In the Department of Colour Chemistry and Dyeing there were 48 undergraduate students in the eightieth (1958-59) and 45 in the eighty-first (1959-60) session, with 17 and 23, respectively, working for higher degrees. A study of the influence of the acetyl value of acetate rayon on the rate of dyeing and affinity of disperse dyes was completed. Work continued on the kinetic and thermodynamic aspects of the dyeing of acetate rayon with sulphated dyes and on the influence of the chemical constitution of non-ionic azo dyes on their affinity for cellulose. Other work

has been concerned with the effect of benzyl alcohol and *n*-butyl alcohol on the absorption by wool of dyes containing metal and the chemistry of ketones related to *mesobenzanthrone*, particularly their behaviour towards substituting agents and their ability to undergo self-union in alkaline media with formation of vat dyes. An investigation of the status of sulphinic acids as substituting agents yielded some interesting and potentially useful sulphones and some new reactions, and provided an explanation of the course of several applications of sulphinic acids in organic chemistry. Work was completed on derivatives of 2-methylanthraquinone and 2-alkylquinizarins and the influence of the chemical constitution of non-ionic azo dyes on their affinity for cellulose. Lists of publications during the year are included in both reports.

## THE BRITISH LEATHER MANUFACTURERS' RESEARCH ASSOCIATION

THE annual report of the British Leather Manufacturers' Research Association for the year October 1960-September 1961\*, includes the reports of the Council and of the Director of Research, the latter including a list of publications, together with details of membership of the Council, its committees and of staff. Renewed attention was given to the problem of finding new outlets for leather and emphasis was placed in a report to the Council on the overwhelming importance of using the raw hides and skins to the best advantage.

The Director's report outlines the programme of research for 1961-62 and notes some features of the current year's work. In background research, work on the composition of skin proteins centred on the separation of collagenous and non-collagenous protein in acetic acid extracts of calf-skin. Investigations of the mechanical and elastic properties of collagen and leather have been extended to combination-tanned fibres, both semichrome and chrome re-tan. In studying the deterioration of leather by heat, moisture and perspiration it has been shown that exposure to dry heat or to high humidities at normal temperatures causes little deterioration and that it is the combined action of heat and moisture which is deleterious, involving breakdown of polypeptide chains both by hydrolysis and an oxidative process involving loss of amino-acids.

\* British Leather Manufacturers' Research Association. Annual Report, 1960-61. Pp. 58. (Egham: Surrey: British Leather Manufacturers' Research Association, 1961.)

Experiments in which sheep-skins were deliberately allowed to stale before using have shown that while staling reduced the quality of the skins, as judged by thinness, pits and holes and also the strength of the leather, it did not appear to lower rot-resistance. Examination of the effect of adding antiseptics to the salt used for curing sheep-skins indicated that processes within the control of the fellmonger or tanner have at least as big an effect. Progress in reducing the cost of unhairing by enzymes is reported through the demonstration that the enzyme liquor can be re-used several times. It has also been found that salt concentrations of 10 per cent or more reduce enzyme activity in de-wooling sheep-skins and a 2 per cent solution of enzyme is just as effective as a 20 per cent solution.

Other work has been concerned with control of the thickness of vegetable-tanned sole leather, vegetable tan sludges, laminated leathers and solvent-assisted dyeing, in which a technique was developed for topping suèdes by spraying by emulsifying in water a solution of the pigment dyestuff in benzyl alcohol. More recently, anionic dyestuffs have been dissolved in a single-phase solvent system of water, isopropyl-alcohol and benzyl alcohol and sprayed direct on to the leather. Work has been started on new impregnating finishes for upper leather and considerable progress made in waterproofing chrome upper leather with silicones. The outstanding problem remaining is to improve the retention of silicones by the leather over long periods of use.

## NEW DIRECTIONS IN PETROLEUM EXPLORATION, PRODUCTION AND TRANSPORTATION

WRITING in the November-December 1961 issue of the *Battelle Technical Review* published by the Battelle Memorial Institute, Columbus, Ohio, Dr. Frank C. Croxton propounds some novel, if not revolutionary, ideas for explorations of oil-pools, techniques for crude-oil production and transportation.

In the field of exploration location of future oil deposits envisages extensive use of gas surveys, microbiological indicators, radio-geochemical methods and advanced electronic instruments. The aim is development and use of geophysical methods of greater sensitivity and portability, thus utilizing more direct methods of oil-finding, especially in "vast