

of prickly pear in Australia. He showed that the initial successes obtained in this work have now been very greatly extended, and that large areas formerly rendered uninhabitable and useless for agricultural purposes by the invasion of the prickly pear have now been freed completely from this pest and are being brought under cultivation.

The morning of June 25 was devoted to meetings of committees, and the afternoon to a discussion, opened by Dr. W. J. Hall, of orchard pests in various parts

of the world. In the evening an official dinner was given to the delegates by His Majesty's Government at Lancaster House, St. James's, under the chairmanship of Lord Passfield, Secretary of State for the Colonies.

The final meeting of the Conference was held on June 26, and was followed on Friday, June 27, by a visit to the Rothamsted Experimental Station and Pathological Laboratory of the Ministry of Agriculture at Harpenden.

W. R. THOMPSON.

### Cellulose and Sodium Hydroxide.

THE British Cotton Industry Research Association has recently issued two memoirs (reprinted in the *Journal of the Textile Institute*, vol. 20, T. 373, 1929; and vol. 21, T. 225, 1930) in which S. M. Neale describes some work on the physical chemistry of cellulose. Regarding cellulose as a linked series of glucose residues with -OH and -O- groups as reacting points, it is shown that the behaviour in alkaline solutions can be explained by treating the -OH groups as sources of potential acidity, with their capacity for liberating hydrion governed by the law of mass action, so that an average dissociation constant can be assumed for the primary acid ionisation of cellulose in any state of complexity. In developing this idea it is necessary to employ the Donnan equation of membrane equilibrium to allow for the fact that the assumed cellulose ion is coherent and unable to diffuse. By assuming an approximate value of  $2 \times 10^{-14}$  for the dissociation constant it is possible to calculate approximately the osmotic swelling pressure of cellulose in solutions of caustic soda of any concentration. The calculated osmotic pressure curve is strikingly similar to the curve obtained by plotting the imbibition of water by regenerated cellulose (cellophane sheet) against the concentration of alkali in which it is placed, while the amounts of alkali taken up are shown to be consistent with the stoichiometric conversion of cellulose into the mono-sodium salt at high alkali concentrations, when allowance is made for the alkali imbibed in accordance with the Donnan equation.

The peculiar effect of temperature on the swelling curve of cellulose in sodium hydroxide solution is

a consequence of the theory and arises essentially from the increasing hydrolysis of the cellulose salt at high temperatures. The amount of heat developed in the reaction between cellulose and sodium hydroxide has been determined and is found to rise continuously with the concentration of the alkali. The heat effects at all concentrations are in fair agreement with values calculated on the assumption that the heat of ionisation of cellulose is comparable with that of the monosaccharides. Allowance is made in these calculations for the very large additional heat effects arising from the higher energy content of alkali in concentrated as compared with dilute solution, and from the dilution of the bulk alkali by the water molecules set free and those formed as a result of the postulated chemical reaction.

When cellulose in equilibrium with any given solution is immersed in a solution of widely different concentration, striking transient volume changes are observed. These are explained in terms of the osmotic theory which is put forward, and arise from the fact that the water diffuses more rapidly than the alkali. The data presented in the second paper describe the behaviour of regenerated cellulose in solutions of sodium hydroxide more dilute than half-normal, and it is shown that in this region the absorption of alkali and the swelling of the gel are quantitatively explained by assigning to the ionisation constant of cellulose the value  $1.84 \times 10^{-14}$  at 25° C.

The considerations of these papers are largely applicable to the behaviour of cotton hairs in caustic alkali, and go far towards making clear the chemical and physical mechanism of the process of mercerisation.

### Geology of Ceylon.

IN the little pamphlet referred to below<sup>1</sup> Dr. Adams brings together the work of former investigators in Ceylon, savouring his account with important conclusions derived from observations of his own. The geological structure of the island is outlined for the first time, analyses of rocks are given and, above all, there is an admirable geological map, the first of the whole island to be produced. A list comprising seventy references is provided.

The historical side is touched on briefly in an "Introduction", wherein it is stated that man had not reached the Palæolithic stage, when probably "by means of a then existing land bridge" he arrived on the island. The successive invasions from Neolithic time to the occupation by the British in 1796 are summarised in a few paragraphs. After a review of earlier publications, Dr. Adams deals with the topography and brings out clearly the three peneplana- tions to which the land has been subjected, illustrating his explanation with four admirable plates, two being reproductions of sheets of official maps.

Investigators in Ceylon are fortunate in having such a sound basis for their work as this topographical survey produces. To these three peneplains, clearly visible, must be added a fourth, the submarine plateau.

The subaerial surfaces of erosion, representing stationary conditions in a periodically renewed upward movement, are respectively 100 feet (the coastal plain), 1600 feet and 6000 feet above sea-level and are of more than local interest. Whether they are or are not due to marine erosion is left an open question—the author inclines to subaerial denudation—one notes in passing that Wayland assigns the first and second to the former cause. Dr. Adams suggests that the Deccan Plateau is perhaps a continuation of the second, possibly the uplands of the Nilgiris represents the third planation, making the comment that so well defined a series of erosion surfaces may yet be recognised in other fragments of 'disrupted' Gondwana Land. He suggests Madagascar in this connexion. The present writer would add the Northern Frontier Province of Kenya; the type of country, a wide stretching plain with suddenly rising 'buttes' or residual hills, is essentially the same as that shown by Dr. Adams in Plate II.

As it must be, the topography is influenced by the strike of the foliation of the crystalline rocks, but in Ceylon ("an admirable relief map of the island" exists in Colombo) the strike ridges swing in successive loops resembling, as Dr. Adams has it, "a series of garlands pendent from the northerly extremity of the Island";



they follow approximately the outline of the coast. The island, in fact, is a portion of a much eroded syncline, the axis in general trending north and south a short distance east of Kandy and Nuwara Eliya. Altogether, this is a stimulating portion of the book.

For the Pleistocene, the Miocene at the extreme north of the island and the very small area of non-marine Jurassic beds at Tabbowa, the author relies principally on data collected by Wayland; for the Archaean, which constitutes so very large a proportion of the whole, Coomáraswámy is a noteworthy contributor. Acknowledgment for information received, especially concerning the gem deposits, is made to Mr. J. S. Coates, the Principal Mineral Surveyor. The crystalline rocks present many interesting features, and the resemblances they bear to those of other lands attract Dr. Adams's attention. He points out the essential identity of the dominant quartzose biotite-gneisses with "hundreds of occurrences in the Laurentian of Canada" and the "striking resemblance" of the limestones to those of the Grenville Series of the Canadian Shield. Doubtless the island is the southward extension of the Bengal gneiss with which, in Ceylon as in India, khondalites are associated. Of these analyses are given. Nine analyses of charnockites and four of allied rocks, together with a table of norms, increase our knowledge of that interesting series. Much petrographical detail is provided, but a few photomicrographs would have added to the value of the work.

The geological map, with an east and west section through the island, shows the limestones, quartzites, and khondalites differentiated from the huge expanse of biotite-gneiss, the distribution of the charnockites in the southern part of the island and in addition the Galle Series of Coomáraswámy, a group distinguished by the occurrence of scapolite and wollastonite. The strike of the foliation is made clear by broken lines. Doubtless, as Dr. Adams comments, there is yet room for additional study in Ceylon, but in this work we have the most valuable contribution to the geology and physiography of the island produced for many years.

JOHN PARKINSON.

<sup>1</sup> *Canadian Journal of Research*. "The Geology of Ceylon." By Frank Dawson Adams. (Ottawa: National Research Council of Canada, 1929.)

### University and Educational Intelligence.

**BIRMINGHAM.**—At the recent degree congregation the degree of D.Sc. was conferred on Mr. Edward Tyler for published work on liquid jets, vortices behind aerofoil sections and rotating cylinders, eddy flow from annular nozzles, and other aerodynamic investigations.

Dr. H. B. Keene is resigning his post as lecturer in physics on being appointed head of the Physics Department of the Birmingham Municipal Technical College.

The fiftieth anniversary of the opening of Mason College and the thirtieth anniversary of the granting of the charter to the University of Birmingham are to be celebrated in October, the programme including a special degree congregation at which honorary degrees will be conferred on, among others: Sir William Hardy, Prof. R. Robinson, Dr. F. E. Smith, and Sir Thomas Lewis.

**EDINBURGH.**—At a meeting on July 14, the University Court accepted the resignation of Mr. J. G. Semple, lecturer in mathematics, on his appointment to the chair of mathematics at Queen's University, Belfast. Mr. Alexander Oppenheim was appointed

lecturer in mathematics in place of Mr. Semple. The resignation of Mr. L. A. Harvey, lecturer in zoology, was intimated on his appointment as head of the department of zoology in the University College of the South-West at Exeter.

**LONDON.**—The following appointments have been made: Dr. Samson Wright, lecturer in physiology at King's College, to be University professor of physiology (Middlesex Hospital Medical School); Dr. Alexander Robertson, University reader in chemistry at East London College, to be University reader in biochemistry (London School of Hygiene and Tropical Medicine).

Mr. J. G. Thomson (medical protozoology) has been given the title of professor in respect of the post held by him at the London School of Hygiene and Tropical Medicine.

Dr. G. S. Wilson (bacteriology as applied to hygiene) has been given the title of professor in respect of the post held by him at the London School of Hygiene and Tropical Medicine.

The title of emeritus professor of physics in the University has been conferred on Prof. C. H. Lees on his retirement from East London College.

**OXFORD.**—Applications are invited from members of Magdalen College for the Edward Chapman research prize, value £20, for a published piece of original research in one of the following departments of natural science: physics or chemistry, including the sciences of astronomy, meteorology, and mineralogy or geology, or the biological sciences of zoology and botany, whether treated from the morphological, palæontological, physiological, or pathological point of view. Competing essays should be sent by, at latest, Oct. 11 next, to Prof. H. L. Bowman, Magdalen College.

THE Ramsay Memorial Fellowships Trustees have made the following awards of new fellowships for the session 1930-31: Mr. W. R. Angus, a fellowship of £300, tenable for two years, at University College, London; Dr. K. Krishnamurti, a fellowship of £300, tenable for one year, at University College, London; Dr. James Bell, a Glasgow fellowship of £300, tenable for two years, at University College, London; Dr. A. Girardet, a Swiss fellowship of £300, tenable for one year, at the University of Edinburgh. The Trustees have renewed the following fellowships: Dr. H. Erdtman (Swedish Fellow), University College, London; Dr. A. Klinkenberg (Netherlands Fellow), University of Cambridge; Prof. Y. Nagai (Japanese Fellow), University College, London; Dr. Lloyd M. Pidgeon (Canadian Fellow), University of Oxford.

NOTICE is given by the President and Council of the Royal Society of forthcoming awards of Moseley, Mackinnon, and Lawrence research studentships. The first-named will be for "the furtherance of experimental research in pathology, physics, and chemistry, or other branches of science, but not in pure mathematics, astronomy, or any branch of science which aims merely at describing, cataloguing, or systematising", and the value £350 per year; the second will be for the purpose "of furthering (i) natural and physical science, including geology and astronomy, and (ii) original research and investigation in pathology", and the value £350 per year; the third will be of the value of not more than £200 for one year, for research in some subject related to the cause and cure of disease in man and animals. Forms of application, returnable not later than Oct. 11, may be obtained from the Assistant Secretary of the Royal Society, Burlington House, London, W.1.