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 2×10^{-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 $1{\cdot}84 \times 10^{-14}$ 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 [1] 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 peneplanations 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";