of the enzymes involved, however, remains an open question and will form the basis for future investigations.

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Effect of Partial Acetylation on Jute

PARTIAL acetylation as a means of arresting the development of the yellow to brown colour, produced by photochemical reactions on irradiating bleached jute with a mercury vapour lamp, has been suggested by Peill¹, and Callow and Speakman². The development of this undesirable shade in untreated and bleached jute has been postulated by the latter as mainly due to a sequence of reactions involving the lignin molecule, presumably through the formation of *o*-phenols and subsequent conversion to *o*-quinones. These authors are also of opinion that some discoloration may be caused by the polymerization of furfural liberated from pentosans, or result from condensation reactions between furfural and phenolic groups of lignin. On acetylation, however, the phenolic and alcoholic hydroxyl groups in jute are blocked, and consequently the possibility of the above reactions leading to discoloration is avoided.

During partial acetylation of a cellulosic fibre, the reaction is supposed to take place in a topochemical fashion, and unless the acetylated layer is removed by some suitable solvent, the reaction is expected to be confined to the surface layer of the fibre. Jute is basically composed of cellulose, hemicelluloses, and lignin, and the relative proportion of their hydroxyl groups occurring at the surface layer, which are free for acetylation, is not known. It was therefore considered of importance to determine the relative amounts of acetyl groups which reacted with individual fibre components during the acetylation of jute.

The untreated or bleached jute fabric (3 gm.), when subjected to partial acetylation by refluxing the material with a mixture of acetic anhydride (30 gm.)

and xylene (30 gm.) in the presence of sulphanilic acid (0.06 gm.) as a catalyst for four hours, during which time a definite equilibrium was reached, showed that a high content of acetyl had been introduced. Under the same conditions, however, only a smaller fraction of the available acetyl reacted either with cotton or α -cellulose isolated from jute. This greater affinity of jute for acetyl groups is therefore most likely due to the presence of hemicelluloses or lignin or both. Since holocellulose isolated by two successive treatments with sodium chlorite solution (0.7 per cent) at pH 4, at 100° C., takes up a greater amount of acetyl (see table) than when the hemicelluloses are eliminated from jute fabric by boiling with 10 per cent caustic soda solution, which also removes only a small quantity of lignin, it seems likely that when untreated or bleached jute is acetylated, the hemicelluloses are responsible for more of the acetyl groups attacked compared with lignin. Furthermore, as the isolated jute α -cellulose is capable of reacting with only a small amount of acetyl, it is probable that, during acetylation of untreated or bleached jute, the cellulosic component plays a less important part compared with hemicelluloses and lignin.

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'Lampbrush' Fibres in the Chromosomes of *Chrotogonus incertus* Bolivar

THE meiotic chromosomes of the grasshopper, *Chrotogonus incertus* Bolivar (collected at Allahabad), assume typical 'lampbrush' appearance at pachytene, which condition persists to the end of diakinesis, but disappears completely at the first metaphase. This condition has been reported by Hsu¹ in two different species of grasshoppers, and, judging from illustrations, it seems to have been observed in grasshoppers by other investigators also, even though they do not explicitly describe it^{2,3}. Hsu¹ has put forward an ingenious theory, based essentially on Goldschmidt's⁴ interpretation of the 'lampbrush' chromosome, which links up spiralization, heteropycnosis and the formation of 'lampbrush' processes. According to him, heterochromatinic heteropycnosis is not due, at least not entirely, to differential nucleic acid synthesis⁵, but to a difference in the capacity to undergo cyclic condensation. Negative heteropycnosis results from the fact that the intracellular conditions permit the growth of 'lampbrush' fibres on the X-chromosome, whereas the autosomes become compactly coiled. Positive heteropycnosis results when the conditions are reversed; the X-chromosome undergoes condensation, but not the autosomes, which, in consequence, show the 'lampbrush' fibres. Polymerization of the nucleoprotein, he claims, causes the chromosomes either to be coiled or show 'lampbrush' fibres. Now in the spermatocytes of *Chrotogonus*, late diakinesis chromosomes, although considerably condensed and consequently much shorter than the pachytene threads, are provided with 'lampbrush' fibres similar in size and shape to those of the earlier stages. So, condensation (spiraliza-

Sample	Loss in wt. due to chemical treatment (per cent)	Increase in wt. due to acetylation (per cent)*	Initial acetyl content of the material (per cent)*	Introduced acetyl content (per cent)*
Purified cotton	—	4.3	Nil	4.36
Jute α -cellulose	39.7	3.3	0.79	4.60
Dewaxed untreated jute	—	11.9	5.94	13.55
Jute bleached by treating successively with NaOCl and H ₂ O ₂	8.2	13.5	3.09	14.52
Jute holocellulose	16.8	11.7	4.06	14.28
Dewaxed jute fabric boiled with alkali	26.6	10.8	0.34	11.95

* Expressed on bone-dry unacetylated material.