at times reached high levels ; concentrations of the order of 600–1,000 mgm./l. (by bioassay) were found in rots of Bramley's Seedling apples. We have also found that sap from natural rots caused by *P. expansum* frequently contains an antibiotic with the antimicrobial spectrum of patulin. Thus the antibiotic patulin is produced under natural conditions, and, in view of the importance of *P. expansum* as an apple pathogen, probably in considerable quantities.

The known phytotoxic properties of patulin suggested that it might play a part in the production of rot symptoms. Strains of *P. expansum* which produce little or no patulin in culture media also produced no detectable quantities in apple fruits and yet caused equally vigorous rots. Thus it seems unlikely that patulin is concerned in pathogenesis. We hope to deal with this point more fully, in a later publication, and to consider at the same time the role of pectic enzymes. However, it is interesting to speculate whether the production of such substances as patulin, fusaric acid[1] and alternaric acid[2] in plant tissues by fungal parasites may not to some extent discourage secondary invaders, preserving territory, as it were, for the primary parasite.

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Response of Animal Fibres to Acid Attack

THE stress–strain curves given by a wide range of animal fibres in air or water are practically alike, apart from differences in the low-strain region due to the presence of crimp. It has now been observed that even closely similar wools can exhibit substantial differences in the mechanical properties of their fibres, and corresponding differences in solubility in alkali, after exposure to chemical attack, such as boiling acid solution.

Such differences had been found to exist earlier among keratin fibres from different animal species[1] ; but their occurrence between wools from the same type of sheep was unexpected.

The two wools used in these studies were closely similar in mean diameter (21·9 and 22·1μ, respectively), but differed in their crimp-level (14·8 and 8·9 crimps/in. in the staple). Samples of clean intact wool were treated under reflux with 100 vol. of boiling 0·04 *N* sulphuric acid for various times, following the procedure used earlier in this laboratory[1,2] ; the alkali solubility was then determined, and the rate-constants for the acid-sensitizing reaction calculated, assuming two concurrent first-order reactions, by fitting the equation

$$\text{wool}_t = F_o e^{-k_o t} + F_p e^{-k_p t}$$

where wool_t is the fraction of wool found insoluble in the alkali-solubility test after *t* hours of exposure to acid. The '*o*' fraction presumably corresponds to the ortho portion of the fibre cortex, and the '*p*' to the para[1] ; but this is not of primary importance to the present work. The results obtained are given in Table 1.

Table 1

Wool	F_o	k_o	F_p	k_p
High crimp	0·513	0·377	0·408	0·0440
Low crimp	0·521	0·458	0·408	0·0830
P		0·05		<0·001

Both rate constants are greater for the low-crimp wool, indicating that it is more susceptible to acid attack.

Force-extension tests to break were made on the Instron tensile tester at 70° F., in aqueous borate buffer, *p*H 9·2, at a constant rate of extension[3] of 50 per cent/min. ; eighteen fibres were examined for each wool in the intact state and after two exposures to acid. The results for two mechanical properties of the fibres, together with the corresponding alkali-insolubility values, are reported in Table 2.

Table 2

Time in acid (hr.)	Alkali-insolubility			Elastic modulus (gm./cm.²) ×10⁻⁶			Breaking energy (gm.-cm./cm.³) ×10⁻⁴		
	High cr.	Low cr.	*P**	High cr.	Low cr.	*P**	High cr.	Low cr.	*P**
0	93·4	94·1	—	13·6	14·5	0·2	34·1	36·7	0·2
4	47·0	39·1	0·001	8·4	6·7	0·01	14·3	10·2	0·0
16	24·7	16·6	0·001	4·0	3·6	—	3·4	2·7	—

* Values greater than 0·2 not listed

All the parameters derived from the stress–strain curve show, like the alkali-insolubility values, that the low-crimp wool has suffered greater degradation as a result of acid treatment. The properties derived from the yield portion of the curve (stress at 20 per cent extension, energy for 20 per cent extension) exhibit less change after acid attack, and differentiate less clearly between the two wools than either the low-strain properties (uncrimping stress, elastic modulus, stress at 5 per cent extension) or the properties at break (particularly breaking stress and breaking energy).

The difference between the two wools in their susceptibility to chemical degradation is sufficiently large to be detectable in the properties of fibres from fabric dyed with metallized acid dyestuffs ; furthermore, this difference is reflected in the resistance of the fabric to flex-abrasion, wet, determined on the Stoll tester[4].

Preliminary results on other wools do not suggest that the difference in response to acid attack between the two specimens studied is related directly to their crimp configuration.

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