It seems that the abortions resulting from nitrate poisoning in cattle are not related to a decrease in the level of DPNH-dependent diaphorase which is common to the entire species. However, we have not been able to examine individual foetuses, which were aborted as a result of nitrate poisoning, to rule out the possibility of a genetic polymorphism.

This investigation was supported in part by a U.S. Public Health Service research grant from the National Heart Institute.

JOSEPH E. SMITH
ERNEST BEUTLER

Division of Medicine,
City of Hope Medical Center,
Duarte, California.

[1] Radeleff, R. D., *Veterinary Toxicology* (Lea and Febiger, Philadelphia, Pa., 1964).
[2] Ross, J. D., *Blood*, **21**, 51 (1963).
[3] Scott, E. M., *J. Clin. Invest.*, **39**, 1176 (1960).
[4] Lewis, D., *Biochem. J.*, **48**, 175 (1951).
[5] Betke, K., Greinacher, I., and Hecker, F., *Arch. Exp. Pathol. Pharmakol., Naunyn-Schmiedegerg's*, **229**, 220 (1956).

BIOPHYSICS

Relationship of Ortho-cortex to the Crimp Wave in a Double-crimped Wool

THE cortex of a crimped Merino wool fibre comprises two hemi-cylinders, which differ in both chemical and physical properties. The form of the crimp wave is related to alternations in the positions of the two cortical components within the fibre—the ortho- and the para-cortex[1–4]. The ortho-cortex tends to lie on the convex aspect of the crimp wave and the para-cortex on the concave aspect.

The ortho-cortex can be demonstrated *inter alia* by dyeing with cupric ion in acidic nitrite solution[5].

Wool staples which have two clearly discernible staple crimp forms, one of short wave-length and the other of longer wave-length, occur in certain Merino wools from time to time. The question arises as to the alternations of the ortho- relative to the para-cortex, when the situation is complicated by the presence of two staple crimps.

An excellent example of this type of wool was received from the Western District of Victoria. The primary crimped form had 20–22 crimps/in. and the secondary had 6 crimps/in. The terms primary and secondary are used arbitrarily and purely for reference. A staple was dyed with cupric ions in acidic nitrite solution (1 per cent cupric sulphate in 1·5 per cent w/w aqueous sodium nitrite in 3 per cent acetic acid with a wool/liquor ratio of 1 : 120 or 1 : 150 for 10 min at 65–75° C). Ten fibres were withdrawn, of mean diameters ranging from 15μ to 27μ. These were thus removed from the staple environment and its forces, and cannot be assumed to have retained their intra-staple forms. However, the primary and secondary crimp forms were still clearly evident, and to allow examination by the microscope, the untensioned fibre was laid on a glass slide and a glass coverslip gently lowered on to it to hold the fibre in a single plane. The camera lucida image of the fibre with the position of the ortho-cortex inserted was traced by hand. Magnified lengths were correct, but the width was doubled for convenience in marking.

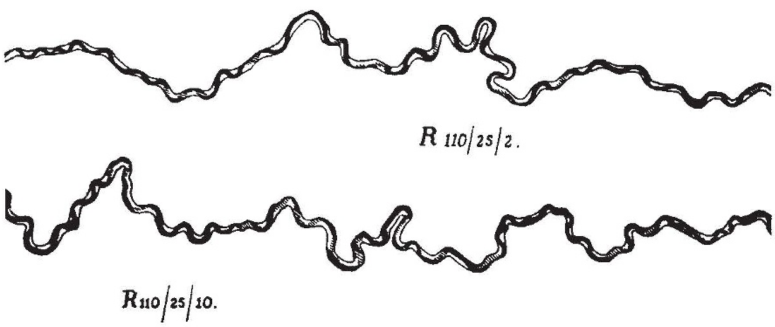

Fig. 1. Tracing of the ortho-cortical layer (black and shaded) in relation to the crimped form of two Merino wool fibres, withdrawn from a staple showing a short wave-length primary crimp and a longer wave-length secondary crimp. The relaxed fibre has been laid gently between two glass slides to maintain it in a single plane for microscopic examination

The alternations of the ortho-cortex showed two phases. In the first of these, the wave-length of the alternations was constant and in general was associated with a small-amplitude fibre crimp form. In the second, the wave-length was longer and variable and in general associated with abrupt bends in the fibre, which appeared to tally with the secondary crimp. Sometimes the abrupt form changed immediately back to alternations of the first phase; sometimes the abrupt form persisted for a much longer length, before the recovery to the first phase. Fig. 1 indicates two typical cases.

It therefore appears that whatever controls the regular alternation of the ortho-cortex may, by the interruption of its action, lead to the formation of the secondary type of crimp. The alternative may be that the periodic rate of alternation is constant, but the length-rate of growth shows spasmodic changes. Since the fibre axis of wool fibres tends to twist to and fro along its length with a period equal to the wave-length of the crimp form[6,7], it is possible that the abrupt bends may be related to peculiar effects of the axial twist. Unfortunately, measurement of axial twist is extremely difficult to carry out in wool fibres, because these are so sensitive to tensile and torsional forces and to relaxation of cohesive set, when the moisture content changes[7,8].

W. R. LANG
W. K. CAMPBELL

Gordon Institute of Technology,
Geelong, Victoria,
Australia.

[1] Horio, M., and Kondo, T., *Text. Res. J.*, **23**, 373 (1953).
[2] Mercer, E. H., *Text. Res. J.*, **23**, 388 (1953).
[3] Fraser, R. D. B., and Rogers, G. E., *Biochim. Biophys. Acta*, **12**, 484 (1953).
[4] Fraser, R. D. B., and Rogers, G. E., *Biochim. Biophys. Acta*, **12**, 297 (1954).
[5] Corbett, M. J., and Yu, T. M., *Text. Res. J.*, **34**, 655 (1964).
[6] Rossouw, S. D., *J. Text. Inst.*, **24**, T374 (1931).
[7] Goldsworthy, Y. E., and Lang, W. R., *J. Text. Inst.*, **44**, T230 (1958).
[8] Woods, H. J., *J. Text. Inst.*, **24**, T317 (1933).

Crimp Form: a New Factor in Wool Science

WE have endeavoured to estimate the spatial configurations of single wool fibres by means of static and dynamic experiments in the decrimping region[1]. While some fleeces predominantly consist of helical shaped fibres, other fleeces are made up of almost perfectly sinusoidal fibres. Randomized assemblies prepared from the two extreme crimp types reveal strikingly different properties. One of the most outstanding results concerns the unique felting behaviour of wool fibres.

Under the influence of an external impressed force, assemblies of wool fibres in aqueous solution become highly entangled to form a dense mass or "felt". Although this property primarily arises from the unique surface structure of the fibre, no satisfactory explanation has been offered for the large variations that occur among different wools in their ability to felt. The factors to which these variations have most commonly been attributed include diameter, length and crimping. It can be demonstrated, however, that these parameters are of little significance compared with crimp form.