stance of the fibre. When the wool fibre is subjected to friction, especially in hot water with a slight quantity of alkali, these epithenal scales become readily matted and interlocked with each other—"felted," as it is called. Yarns which become felted in the scouring operations are much deteriorated, as they have to be forcibly torn apart, and this naturally weakens and destroys the fibre.

When a wool fibre is examined under the microscope it will be observed that the free ends of the scales all point to the free end of the fibre—that is, the end which is not attached to the skin of the animal. Now, when two of these fibres get side by side with their scales pointing in the opposite direction, the scales interlock one with another, and the two fibres become so closely connected as only to be separated by the exercise of some considerable force, which results in a weakening of the strength of the fibre. When the number of these fibres are multiplied, as in the case of a piece of woolen cloth, and felting of the fibres is brought about by the process known as fulling or milling, it is accompanied by the fabric becoming more compact, thicker in texture, shorter, and narrower.

The great importance of preventing felting during scouring and dyeing is well known to all, but it becomes doubly important when the microscope reveals the extent of the damage it causes to the fibres. Woolen yarns felt more readily than worsted ones, as in the former the staple is short, and the fibres are lying in different directions. In worsted yarn, however, the fibres are longer, and are inclined to lie more in one direction as when growing on the sheep's back.

This felting of wool is produced by using too high a temperature either in the scouring or the dyeing processes, or by excessive handling of the yarn, especially in liquids which are slightly acid, as in dyeing, or slightly alkaline, as in scouring. Dilute acids have the property of opening up these exterior scales of the wool, giving it a more serrated appearance, which is visible under the microscope. The scales being opened, dye solutions can enter into the interior of the fibre better, and there become fixed within the wool, which then becomes permanently dyed. Hence, the value of the addition of acid to the dyebath. The acid, however, has some other functions to perform in connection with the dyeing operation. Under the outside sheath or cuticle, with its overlapping scales, there is the cortical substance of the fibre itself. Upon this depends very largely the elasticity and color of the wool.

The substance consists of almost innumerable minute cells, all tightly bundled together. By treating the wool with suitable chemical reagents—strong sulphuric acid, for example—these masses of spindle-shaped cells can be separated, and their shape observed with the microscope. They are found to be long and tapering in shape, ending in a fine point at each end. Dr. F. H. Bowman, to whom we owe most of our present knowledge of the internal structure of wool, has had the patience and industry to count these, and he tells us that in a cross section of the fibre may be counted 1,500 of these cells, while there are about 6,000 of the scales in an inch of wool fibre. This cellular substance of the wool is what we might term the marrow of the wool fibre, as it constitutes nearly the whole of the inside portion of the fibre.

In many specimens of the wool fibre there is a third part—that is, a central or medullary portion—which, when present, may run through the whole length of the fibre, or it may only appear in detached portions. It has been found, however, that wool which exhibits this medullary portion is generally stiff and more of a hairy nature, not so well adapted for the ordinary purposes of textile manufacture. The finest wool, that of the merino, does not show any core or central medullary cells.

It is interesting to mention in passing that the spindle-shaped cells have a much greater affinity for dyes and coloring matters than the external scales. Wool which has been 'extracted' or 'carbonized" (that is, woolen stuff mixed with cotton, which has been treated with sulphuric acid to remove the cotton) is found to dye a much deeper shade than the ordinary wool for the reason that the outer scales are opened out very much, and so expose the internal scales.—The Textile Mercury.

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## MURVA FIBRE FROM THE STRAITS SETTLEMENTS.

An enquiry relating to the value of Murva fibre grown experimentally in the Straits Settlements was recently referred to the Imperial Institute by the Commercial Department of the British Board of Trade. Owing to the small amount of fibre available, a complete chemical examination could not be carried out, but the following determinations were made by the usual methods. For comparison, the results furnished by the examination of other specimens of this fibre are also quoted:

| | Moisture per cent. | Ash per cent. | Cellulose per cent. | Length of Ultimate Fibre. |
|---|---|---|---|---|
| Straits Settlements ..... | 9.9 | 0.7 | 75.9 | 1 —3 mm. |
| Grenada ..... | 9.5 | 1.4 | 72.7 | 1 —5 mm. |
| Assam ..... | 9.4 | 0.7 | 75.6 | 1.5—3.5 mm. |
| Colonial and Indian Exhibition (Cross & Bevan) ..... | 9.7 | ... | 73.1 | 1.5—3 mm. |

From these results it appears that the fibre from Selangor is fully equal in quality to specimens obtained from other sources.

The fibre has also been submitted for commercial valuation to two leading firms of fibre brokers, who were informed of the favorable results which it had furnished on chemical examination. One firm reports that the sample is a very strong, clear, hard fibre, of good color, but rather short and tapering; it is coarser, and not quite so soft and pliable as is usual for the fibre of Sansevieria zeylanica. Owing to the want of regular supplies the fibre has not a recognized position on the London market, but consignments of long staple have been sold at very high prices. The value of the present specimen is given at about £35 per ton (Sisal hemp being now £37 per ton), but if long and of similar quality it would be worth £40 per ton and upwards. The other brokers to whom the fibre was submitted value it at £33 per ton, and £36 per ton if "bright white," at which prices it would meet with a ready sale.

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## THE WOOLEN INDUSTRY.

A local journal publishes a report that the "woolen trade is in great danger." This announcement might cause considerable disquietude were the trading public not acquainted with the fact that the depression in question is due to causes which are abnormal and temporary. For some time the textile trade in New England has been flat. It has been in a condition that may correctly be called languishing. Curtailment of production has been the order of the day, and it is even hinted that manufacturers there have encouraged strikes to give them an excuse for shutting down. It is well known that in Old England, scores of mills have for months past been running on short time. In Lancashire the situation has been going from bad to worse until it has culminated in a crisis that has closed hundreds of mills and cast thousands of operatives adrift on the public charity.

So serious have things become in the Manchester dis-