

the change from true wool to kemp is only partial. The lower part of the illustration shows wool structure (the scales being distinctly visible), whereas the upper portion of the fibre shows the kemp structure (having the scales closely attached to the surface, giving the fibre the usual ivory-like appearance.) Both illustrations, Fig. 58, *A* and *B*, are representations of fibres seen by reflected light. In Fig. 59, *A* and *B*, illustrations are seen by transmitted light. In *A*, a kempy fibre is seen with transmitted light, and there we see a gradual passage of the kemp into wool. In this case, with transmitted light the kempy part retains almost the same transparency as the wool, but exhibits none of



FIG. 60.

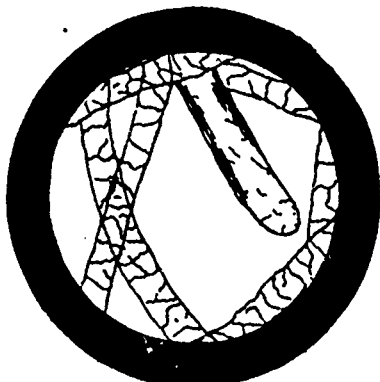


FIG. 61.



FIG. 62.

the interior arrangement of cells. Frequently fibres are noticed which have a tendency to kemp, and which possess an unusual distinctness in medullary cells. Indeed, it frequently happens that the kempy structure tails off in the same fibre, not so much as we should have

supposed on the outer surface, but down the interior of the fibre, as though the change commenced in the central cells and was gradually extended to the outer surface as the fibre grew. At the extremity, where the kempy structure first appears, the central cells are often not contiguous, as though the change commenced in a few cells first and then became more numerous both in the longitudinal as well as the diametrical direction. These kempy fibres often have a considerable degree of transparency when viewed with transmitted light, and in this respect they vary much, but they are seldom as transparent as the adjacent wool fibres.

Sometimes, however, they are very opaque, as will be seen in the fibre shown in Fig. *B*, where the light seems hardly to penetrate the centre of the fibre, although it is refracted at the thinner edges, while the true wool, both above and below, is quite transparent to the same light. In this case, the same fibre, when viewed with reflected, instead of transmitted light, exhibited no more signs of a dark color in the kempy than the true wool part, so that the want of transparency was not due to coloring matter.

Kempy fibres are not always white; they are frequently found in coarse, dark colored, foreign wools, and even in the colored fibres of more cultivated sheep.

Shoddy is wool fibres re-manufactured out of soft woollen rags which have yet felting properties. If examining the shoddy wool more closely its color will betray the inferior article compared with wool. The rags had previously to re-dyeing different colors, which will influence the second color accordingly. Of the accompanying illustrations Fig. 60 shows cheviot shoddy. Fig. 61, Thibet shoddy as visible under the microscope when magnified. Mungo is the name for wool fibres re-manufactured out of hard woollen rags, *i.e.*, a cheaper grade of shoddy, made out of rags from fulled cloth. During the process of re-manufacturing said rags into wool by means of picking, carding or garnetting, a great many fibres get broken. Besides, on account of the rags coming from fulled cloth, this mungo wool has no more fulling properties left. The point regarding color previously mentioned as shoddy wool will also distinguish mungo wool from wool. Frequently cotton fibres will be found amongst mungo, in some cases silk fibres. Fig. 62 gives us a typical illustration of mungo when seen under the microscope. Wool extract, also called *extract*, is artificial wool produced from mixed rags from which the vegetable fibres were extracted by means of carbonizing.

An examination of a sample of extract by means of the microscope will show traces of the process of carbonizing, by means of the carbonized vegetable refuse. All three divisions of artificial wool are by some manufacturers simply collectively graded as shoddy, and will be so considered when dissecting woven or knitted fabrics with reference to materials used in their construction.

Among the foreign wools are Mohair, Cashmere, Alpaca, Vicugna, and Llama wool. Mohair is obtained