The Identification of Textile Fibers

By Dr. Louis J. Matos

The peculiar characteristic of wool is the scales on the outer surface which, when once seen and understood, serve to identify wool fibre whenever found and make specific chemical tests unnecessary.

To identify certain other vegetable fibres, chemical tests are necessary in conjunction with their microscopic peculiarities.

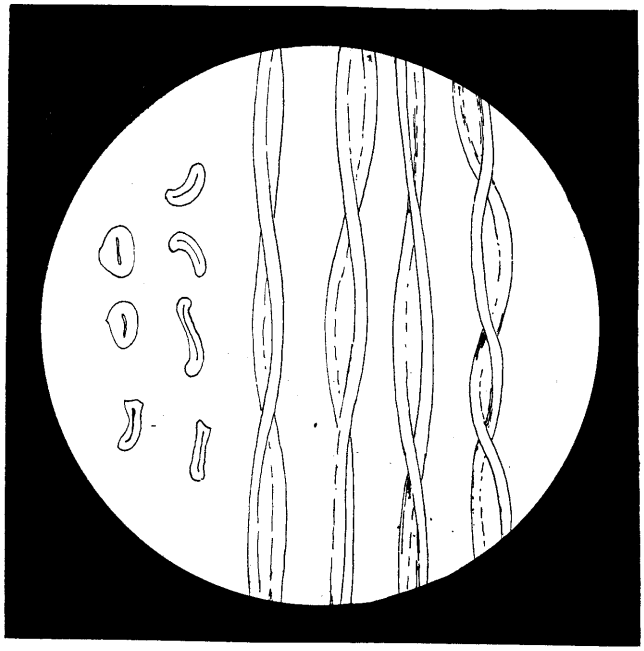

FIG. 9.—COTTON FIBRES UNTREATED.

Of the vegetable fibres cotton is the most important. The cotton fibre is separated from the seed by the process known as "ginning." The open end of the fibre is the end nearest the seed hair, while the pointed end is the growing tip. In form the cotton fibre is rather flat and for almost its entire length is twisted upon itself, resembling an empty fire hose that has been twisted. The fibre is likewise hollow for its entire length.

Fig. 9 shows the normal appearance of ordinary cotton fibres as viewed under the microscope. The twists in the fibres distinguish cotton from every other fibre. At the right are cross sections of individual fibres, showing the hollow, though flattened structure of each fibre.

Fig. 10 shows the appearance of the same fibres on the microscope slide, after they have been acted upon by a solution of ammoniacal copper hydroxide (No. 4). This reagent acts upon cotton by first causing it to swell considerably, the fibre becoming much distorted, as if in pain, ultimately quieting down. If the solution is strong enough the fibre finally dissolves.

It is well to carry in mind the leading characteristics of the more important fibres.

The peculiar twists determine the identity of cotton under the microscope without recourse to any chemical test. A table to appear later will give the parallel tests with reagents, showing the reactions of the different vegetable fibres.

The other commercially important fibres, known as *bast fibres,* are not seed hairs, but are fibres obtained from the stalks of plants, such as flax (linen), hemp, jute and ramie (china grass). The bast fibres constitute that portion of the seed which gives the plant strength and occur in bundles extending for the entire length of the plant. Unlike cotton, they are not isolated, but each fibre is bound or cemented to its neighbor by a natural cement or binding material known as lignin. The most important bast fibre is flax, otherwise known as linen. To isolate the flax fibre the plant must be subjected to a wetting process called "retting," the object of which is to loosen the soft portions of the stalk and to dissolve the lignin, thereby setting free the fibres. Flax of commerce consists, not of isolated fibres, but of the separated bundles, consequently in examining flax and other bast fibres the preliminary operations of testing should be to remove the lignin completely by boiling bundles in a weak solution of caustic soda, which still further loosens the fibres and enables the operator to isolate them. The characteristics of flax and other bast fibres will be fully illustrated later.

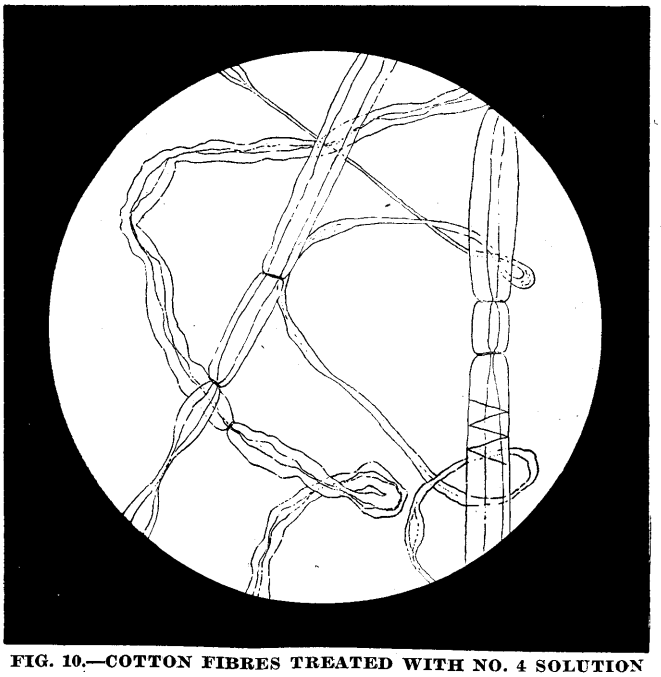

FIG. 10.—COTTON FIBRES TREATED WITH NO. 4 SOLUTION

For carrying out both the microscopic and chemical tests for fibres, the total equipment is not extensive nor expensive. The work may be conveniently done upon a small table which should be sufficiently stable so as not to shake. The chemical reagents and other accessories may be kept conveniently in a small closet or box to protect them from dust, or set in holes bored in a block of wood, as shown at Fig. 3.

The next article will give specific methods for testing vegetable fibres both microscopically and chemically.