

The Adulteration of Silk.



MOST persons are familiar with analyses of various minerals and vegetables, made with a view of ascertaining and determining their relative degrees of purity. But a method by which such a delicate fabric as silk is capable of being assayed, of being put through a fire-and-water ordeal, flung into a crucible, and brought out free from all impurities, is a novelty of a very startling nature, for who would have supposed that silk is adulterated?

From its nature silk is more susceptible of absorbing moisture than any other fibrous article. In fact it approaches in this respect to the quality of sponge. Well-dried silk, when placed in a damp situation, will very rapidly absorb five or six per cent. of moisture, and, being very dear, and being always sold by weight, this property gives large opportunity for fraud. Yet this is not the only channel for malpractices. Silk as spun by the silkworm contains among its fibres in very minute portions a quantity of resin, sugar, salt, &c., to the extent generally of twenty four per cent. of the entire weight. This peculiarity leads to the fraudulent admixture of further quantities of gum, sugar, and even fatty substances, to give weight to the article; consequently, when a dealer or manufacturer sends a quantity of raw silk to a throwster to be spun into silk-thread, it is no unusual thing to find it heavily charged with adulterate matters. When he sends that silk to be dyed he will find out the loss, provided the dyer does not follow up the system by further adulteration. The presence of foreign substances is fatal to proper dyeing; hence the dyer proceeds to get rid of them by boiling the silk in soap and water.

As silk-thread becomes charged with foreign matters in various degrees, given weights of several samples will contain very different lengths. In this way manufacturers are often deceived in the produce of various parcels of thrown silk after it has come from the loom. In our own country, great as have been the strides made by most branches of manufacture, the silk-spinner or weaver has quietly borne all these evils and disappointments, in deepest ignorance of the chemistry of silk. Possibly it is this indifference to science that has left the silk manufacturer so far behind every other son of industry. It is notorious that whilst our cotton, linen, and woollen manufactories have been multiplied tenfold during the last twenty years, those of silk goods have made scarcely any progress. The manufacturers were themselves perfectly aware of this startling fact, and it was not many years ago that a memorial from them was presented to the Legislature, praying that all remaining protection on their goods might be removed, as the only hope of giving new activity to their slumbering trade. The truth is that Frenchmen are more keenly alive to the value of science in connection with manufacture than ourselves. Whilst our silk manufacturers have gone on upon the old well-

beaten track, those of France have enlisted in their behalf the services of the chemist, who has brought their raw material as completely under his analytical control as subtle gas or ponderous ore. He has demonstrated to a nicety that its relative purity, its strength, its elasticity, its durability, its structure, the very size and weight of each separate fibre, may be shown and registered with precision and certainty. He tells the manufacturer the actual amount of latent moisture contained in a pound of silk; he shows him how much natural gum, resin, and sugar each bale comprises; he points out how much lighter his thread should be after the processes of spinning and dyeing; and, more valuable still, he indicates the most profitable use to which every bale of raw silk is applicable; that whilst one parcel is best adapted for the manufacture of satin, another may be better employed for plain silk, another for velvet, and so on to the end.

In France, Italy, and other parts of Continental Europe, the assaying, or as it is there technically termed, the "conditioning of silk," is carried on under the sanction of the municipal authorities in establishments called "conditioning houses." The quantity thus assayed is published weekly for the information of the trade with as much regularity as a price current. In this way we may find it publicly notified that in the conditioning house at Lyons there were during last year 5,037,628 pounds of silk assayed; at Milan, 3,466,699 pounds; and other large quantities at St. Etienne, Turin, Zürich, Elberfeld, and elsewhere.

Of so much importance has this process been deemed in France that in 1841 a Royal *ordonnance* was passed, setting forth the ascertained weight which silk loses by the conditioning process, and which is eleven per cent. This eleven per cent., added to the weight of the silk after the ordeal it has gone through, makes up what is termed its merchantable weight.

The French have brought to our doors the means of accomplishing what they have practised for many years with so much advantage. We have paid a visit to a conditioning house, and the first operation we beheld was that of determining the humidity of silk. Eleven per cent. is the natural quantity in all silk, but from various causes this is nearly always exceeded. Several samples of the articles having been taken from a bale, they are weighed in scales capable of being turned by half a grain. Two of these samples are then placed in other scales, equally delicate and true—one end, containing the sample, being immersed in a copper cylinder heated by steam to 230 degrees of Fahrenheit; the other, with the weights, being enclosed in a glass case. The effect of this hot-air bath is rapidly seen; the silk soon throws off its moisture, becomes lighter, and the scale with the weights begins to sink. In this condition it is kept until no further loss of weight is perceived, the weight which the silk is found to have lost being the exact degree of its humidity.

The natural eleven per cent. of humidity being allowed for, any loss beyond that shows the degree of artificial moisture which the silk contains. To determine the amount of foreign matters contained in a sample of silk, the parcels—after a most mathematical weighing—are boiled in soap and water for several hours. They are then conveyed to the hot-air chambers, subjected to 230 degrees of heat, and finally weighed. It will be found now that silk of the greatest purity has lost, not only its eleven per cent. of moisture, but a further twenty-four per cent. in the various foreign matters boiled out of it. But should the article have been in any way tampered with, the loss is not unusually as much as thirty or thirty-two per cent.

The assaying of the length of silk is done by ruling off four hundred yards of the fibre, and weighing that quantity; the finer the silk the lighter will these four hundred yards be. But as this gossamer fibre is liable to break, a beautiful contrivance exists for instantly arresting the reel on which it is being wound off, in order that it may be joined and the reeling continued. Another means exists for stopping the reel immediately the four hundred yards are obtained. The degree of elasticity is shown by a delicate apparatus which

stretches one thread of the silk until it breaks, a tell-tale dial and hand marking the point of the fracture. Equally ingenious and precise is the apparatus for testing what is termed the "spin" of the silk—its capability of being twisted round with great velocity without in any way being damaged in tenacity or strength. The last process is purely mechanical. A hank of the silk, on its removal from the boiling-off cistern, is placed upon a hook, and by means of a smooth round stick passed through it a rapid jerking motion is given to it, which, after some little time, throws up a certain degree of glossy brightness. This power of testing its lustre is employed to ascertain its suitability for particular purposes. Should it come up very brilliantly, the article will be pronounced adapted for a fine satin; with less lustre upon it, it may be set aside for *gros de Naples*, or velvet, and in this way the manufacturer can determine beforehand to what purpose he shall apply his silk, and so avoid frequent disappointment and loss. In short, instead of working in the dark and by chance, he works by chemical rules of undeviating correctness. After each of the above assays or conditionings, the owner of the silk is, for a small fee, supplied with an authenticated certificate of its various qualities.

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