

FACTS ABOUT SILK.

Silk is a product found exclusively in cocoons of silk-worms. There are several species of these worms, but the most important is Mulberry Silkworm (*Bombyx Mori*). The fiber of silk (filament) must be unwound from the cocoon a few days after it has been made. Therefore wild cocoons are of little use, as the proper timing is hardly possible. The cultivation of silk-worm has as its aim simultaneous production of a large number of cocoons. This requires special conditions in which temperature and humidity are under control. One cycle of production lasts about half a year.

History. Silk originates in China and we cannot even guess how old its cultivation is. When mentioned for the first time about 5000 years ago, it seems to have already reached a very high stage of development. China had practically a monopoly for production of silk until the 3-rd century AD. Neither the cocoons or the yarn were ever exported from China. Silk fabrics woven in the Near East at the beginning of our era were made by unravelling the imported Chinese cloth.

There are several legends which explain how the "secret" of silk has been smuggled into foreign countries. At any rate silk appears about the 3-rd century in Japan, and shortly after in India. It takes 3 more centuries before it reaches Europe. Until then silk fabrics were so tremendously expensive that according to Rodier, they were one of the factors which speeded up the economical collapse of the Roman Empire.

Now about 80% of silk is produced in Asia - the rest in Southern Europe.

Physical properties. Silk fiber when unwound from the cocoon is always double, i.e. two filaments are glued together with so called sericin. The thickness of the filament is from .001" to .008", and its length varies from 4 to 1500 yards. The filaments are very uniform in thickness and from this point of view they can be compared only with synthetic fibers.

Silk is one of the strongest fibers - as strong as ramie for instance but more elastic (up to 5%). But its most remarkable property is that it can be made into extremely fine yarn. In this respect it surpasses all natural fibers.

Raw silk is not very shiny and has a yellowish colour. This is however due to the presence of sericin, and when the latter is removed, the yarn becomes lustrous and white.

Chemical properties. Raw silk is composed of about 65% of fibroin, 23% sericin, and 12% water. Fibroin contains about 48% carbon, 26% oxygen, 19% nitrogen, and 7% hydrogen.

Sericin is removed by boiling in soap or mild alkalis, either before or after weaving.

Fibroin dissolves both in concentrated acids and alkalis (hot), but is more resistant to alkalis. It burns slowly in about the same way as wool.

Silk is highly absorbent particularly when the sericin is removed. Therefore it can be saturated with metallic salts (iron, tin). This process is called Weighting of silk. Its only purpose is to increase the weight, and slightly - the volume. If the amount of chemical compounds does not exceed the weight of the sericine in raw silk, it does not injure the yarn. Unfortunately industrial weighting often adds as much as 150% to the weight of pure fibroin. This makes the fabrics much less resistant to wear. Heavily weighted silk will break easily if left folded for any length of time, and even desintegrate in storage.

The only safeguard against using weighted yarn is to work with raw silk, and dissolve the sericin later.

Reeling and Throwing. The cocoons are first sorted and then soaked in warm water to soften the sericin. Then the reeling starts. Several filaments are wound together on reels. When one of them ends another is substituted, so that the number of fibers remains constant. The second operation produces the yarn by collecting a sufficient number of fibers and twisting them together. However here the twisting does not play the same role as in spinning of other fibers. The length of silk filaments makes twisting of them optional, when with short fibers of cotton or wool twisting is necessary to build a thread. This second operation is called therefore Throwing and not spinning.

Count of Silk yarn. This is a little confusing. In United States we have still "drams". They designate the weight (in drams or drachms) of 1000 yards of yarn. But there are two "drams": one is one eighth and the other one sixteenth of an ounce (and not of the same ounce). So it does not help very much. Then there are "deniers" - another obsolete unit of weight. In both systems high numbers indicate heavy yarn. For instance No.1 has 4,00000, and No.100 - 45000 yards per pound. But unfortunately there are 4 deniers: legal, international, new, and old. There is not much difference between them (about 10%). To clear a little this confusion we give in the following table the numbers of silk in: deniers, drams, metric numbers, and yards per pound.

Deniers:	Drams:	Metric:	Yds/lb:
1	.03	9000	450000
10	.3	900	45000
33	1	270	13500
66	2	135	6750
80	2.4	113	5650
90	2.7	100	5000
100	3	90	4500
165	5	55	2750
200	6	45	2250
300	9	30	1500
400	12	22	1100
500	15	18	900
800	24	11	550
