

Further to Comm. 1751: Silkworm Gut and the Origins of the Minikin Lute String?

By the end of the 19thC, silkworm gut was being manufactured in quantity for two end uses – fishing tackle and medical sutures.

The finest quality gut was made in Spain and at peak production this country manufactured an astonishing 90 million gut strands a year – 70% of the output being destined for the angling community, the remainder being made into sutures. Other silk producing countries such as Portugal, Italy and Sicily also supplied silkworm gut to this market. The longest lengths of gut came from Syria.

Most silkworm gut came from the domesticated silkworm caterpillar (*Bombyx mori*) although other, larger species, (such as the Tussah moth) may also have been used for making longer lengths of gut. The process – in essence – was simple but in practice required extensive knowledge, skill and expertise to accomplish successfully on a commercial basis (1).

The silk apparatus of the caterpillar consists of two 15inch (38 cm) long glands (2). The liquid silk (fibroin - a protein) passes into the larger diameter mid section of the glands (silk sacs) where it is coated with sericin (a water soluble protein) before passing through two spinnerets in the head of the caterpillar. The liquid silk, spun by the caterpillar, hardens on contact with the air - the two resulting parallel filaments being 'glued' together by the sericin. The diameter of each individual filament is about 0.001inch (0.0254mm) or less and about a mile (1.6km) in length.

To produce silkworm gut, the caterpillar was selected at a critical stage - just prior to starting to spin its cocoon – and killed by immersing it in a strong solution of wine vinegar. The corpse was left to soak in the solution for a number of hours – the vinegar softening the walls of the silk glands to make them elastic (?). The concentration of the acid solution, the temperature and period of immersion, were all critical factors in the operation. When soaking was completed, the caterpillar was pulled apart and the silk glands removed. The glands were then stretched by hand to the required length and fixed to a board to dry. The precise details of the process are not, at present, clear but it is assumed that the elastic walls of the silk sac remained intact during the stretching operation thus ensuring uniformity of the strand.

After drying, the residues of the gland walls and sericin were removed from each strand of silk by washing in a hot soap solution and the strand was then bleached. The dried strands were then sorted, polished, straightened and graded for market.

There were 5 commercial quality grades applicable to each diameter of gut – a total of 14 standard diameters ranging from 0.009inch (0.23mm) to 0.022inch (0.56mm). Smaller diameter gut, down to 0.003inch (0.076mm) diameter was also available. For the angling

market, the graded gut was bundled into hanks of 104 strands for sale. Strand length required for fishing tackle was about 20 inches (500mm) maximum but much longer strands – measuring several feet in length - were also available (3).

In appearance, silkworm gut - as prepared for anglers – is smooth, clear, transparent, hard and strong – it looks and feels just like monofilament nylon.

Salmon fishermen made stronger leaders from smaller diameter monofilament strands by twisting them together into a cord using a “gut twisting engine” (5). The process was the same as that used by rope and cord makers and is described by Kelson (4) who says that three strands of silkworm gut – tied together at one end – were twisted together with about eight turns of the handle of the engine – a slide bar made of wood with three furrows being used to control the evenness of the twist.

It is not known when silkworm gut was first made, but the process was probably known to the Chinese from very early times and, later, to silk producing countries in the Middle East and Europe.

The first silk producing countries outside of China were located in areas of the Middle East served by the so called “Silk Road” an ancient trade route from China which terminated in the ancient cities of Antioch in Syria and Tyre on the Eastern shores of the Mediterranean. Both cities had flourishing silk industries, under Roman jurisdiction, from around 68BC. Antioch (now Antakya) became part of Turkey in 1517AD. Tyre (now Sur), to the South, is today part of Lebanon.

The gentleman that I spoke to recently at the Turkish Embassy in Ottawa confirmed that ‘MINIK’ was a Turkish word – a diminutive, meaning “tiny” or “very small indeed”.

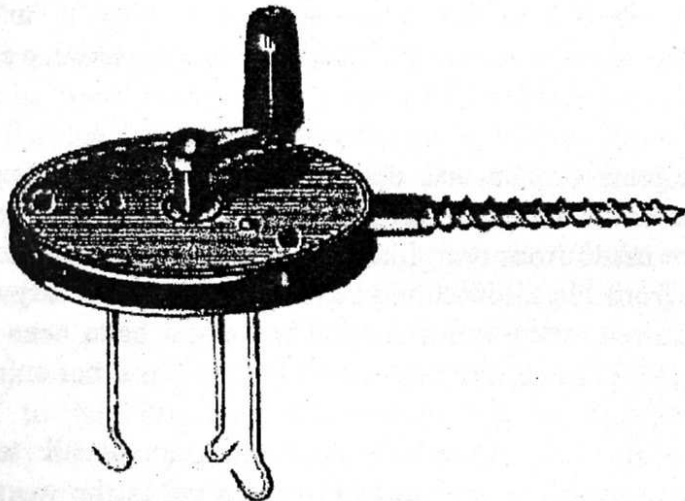
As far as I know, there are no common roots between the Turkish language(s) and English. This then leads to speculation that the source of a very small diameter lute string (known in England as a ‘Minikin’ in the 17thC) may have been the silk industry of Turkey or neighbouring silk producing countries – that is they were very thin, but strong, transparent strings (Minik strings) made from the “bowels” of a silkworm.

In Comm. 1397, Eph Segerman concludes his discussion about the “clearness” of gut by stating that “It is probably unfortunate that the more we can get the (sheep’s) gut to look like nylon, the more authentic looking it seems it will be”. Yes indeed!

Notes

- (1) See the article “Spain’s Silkworm Gut”, The National Geographic Magazine, July 1951, p100-108.
- (2) See the article “The Queen of Textiles”, The National Geographic Magazine, January 1984, p24.

- (3) In his reminiscences of the Depression years - as reported in "The Portage County Gazette" (U.S.A.) - Virgil "Pete" Peters says that Spanish silkworm gut leaders were available in 7.5 and 9 ft lengths and cost 60 cents each. Alexander Rakov reports having seen a silkworm gut leader about 6ft long in a local fly fishing museum. The calculated maximum length of a strand of 0.009 inch diameter that can be made from the contents of the silk sac of a Bombyx mori caterpillar is about 10ft - so the above lengths would seem reasonable. On this basis, the maximum theoretical length for a strand of 0.003inch diameter would be about 90ft! It is doubtful, however, if a strand of such a length and diameter could be made by hand stretching?
- (4) Kelson, George M. "The Salmon Fly", London 1895. See also Keene, John H. "Fishing Tackle, Its Materials and Manufacture", London 1886.
- (5) Engraving of an angler's (silkworm) gut twisting engine, late 19th C (Kelson?). The size appears to be about that of a small fishing reel. Step up gear ratio is not known but it seems to be low from the illustration. Surviving examples may be found in museums specialising in the history of angling.



GUT TWISTING ENGINE.