silk’s cultural history spans more than 5,000 years. Examples of sericulture appear in the Chinese archaeological record as early as the third millennium BCE, and silk fabrics excavated from sites have been dated to at least the Shang dynasty (1600–1046 BCE). Beyond silk’s traditional use in textiles and as a valuable trade commodity, biomedical researchers are currently experimenting with the material in novel forms of technology, as silk is compatible with human tissue; the immune system can accept silk on surfaces as sensitive as the human brain.

In the UMAG exhibition Silk Poems, visual artist and author Jen Bervin melds the medium’s traditional applications with cutting edge research—engaging with silk’s cultural, scientific and linguistic complexities.

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Oracle bone inscriptions on Shang dynasty turtle plastrons and ceremonial bones often include inscriptions for a core group of animals and goods, such as silk, silkworm, book and writing brush. These inscriptions are thought to relate to the core functions of writing and record-keeping, which were essential for the maintenance of the Shang state.

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Reimagining Lacquer

Until the end of the 19th century, lacquer (urushi in Japanese) was primarily made for the samurai—the military nobility of medieval Japan. When they were abolished in the Meiji Restoration of 1868, many lacquer workshops fell into decline as support and demand for their goods dropped. Later revitalised by various government initiatives, production continued largely unaltered until the 1950s, when traditionalists began to compete with the avant-garde, who believed in unfettered aesthetic expression. One of the most influential examples of the latter was Takahashi Setsuro (1914–2007), whose 1953 sculptural work *Munraito* ('Moonlight') demonstrated that lacquer art could be a progressive medium. Since then, a small but enterprising circle of artists has pushed the medium in new directions by employing non-traditional techniques.

**Silk Poems**

*bervin’s poem is modeled on silk at the DNA level—the six-character repeat of the silk genome is the basis for the poem’s six-letter line. The shape of the strand reflects both the filament pattern that silkworms create when making their cocoons and the genetic structure of silk, which forms like the weft thread in weaving. Ongoing research includes scientists dating the genetic split between domestic silkworms and their wild cousins (*Bombyx mandarina*), as well as a focus on altering the genetic code of silkworms to create fibers from cocoons that can be woven into a material stronger than steel and more flexible than Kevlar. Other recent innovations involve developing materials from silk fibers that are naturally antimicrobial, and the fabrication of silk screws for stabilizing broken bones.**

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**Jen Bervin first visited the Tufts Bioengineering Department in 2010, where David Kaplan and Fiorenzo Omenetto were working on a new form of silk—reverse-engineered liquefied silk. Among the department’s research outputs has been a silk biosensor etched nanoscale on clear silk film that can be implanted in the body to provide diagnostic readings. In 2016, Bervin worked with Tufts’ scientists on fabricating her poetry at nanoscale. In this process, a mask is used to etch the poem in gold spatter onto a silicon wafer, and then liquid silk is poured over the wafer. As the silk dries, the letters remain suspended in the film. The etched version of this poem can be viewed at the exhibition’s microscope station.**

Nanoscale science is concerned with physical interactions at extremely small dimensions—one nanometer is equal to one-billionth of a meter. A strand of human DNA is 2.5 nanometers in diameter, while a sheet of paper is nearly 75,000 nanometers thick. Nanostructures can be made by reacting chemicals in liquids or gasses, or by etching a structure with electrons. In nature, the iridescent colors of some butterfly wings contain nanostructures that affect light waves.

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