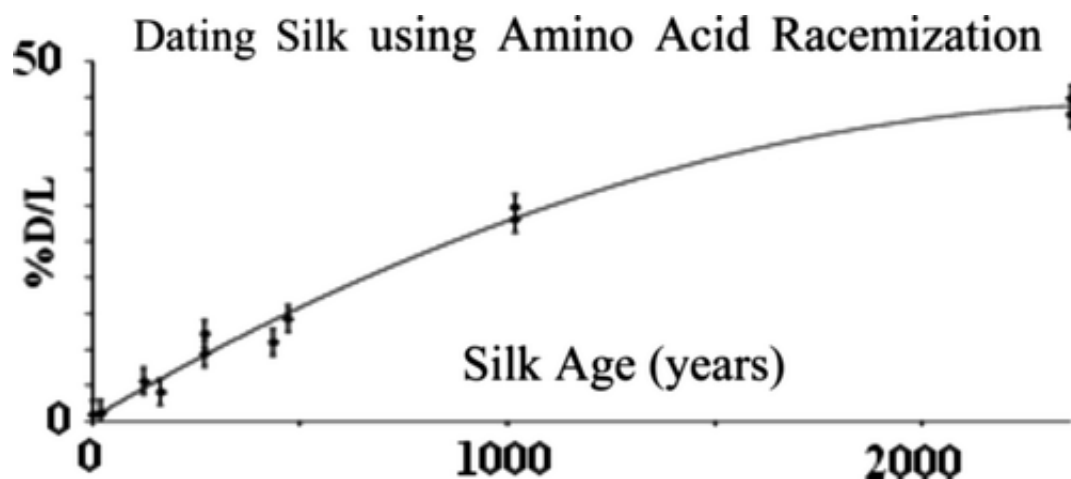


First practical scientific test to date and authenticate priceless silk masterpieces

October 12 2011



Scientists are reporting development of the first fast and reliable scientific method to determine the age and authenticity of priceless silk tapestries and other treasures -- such as Civil War General Phillip Sheridan's famous red-and-white battle flag -- in museums and other collections around the world. A report on their work appears in *Analytical Chemistry*.

Mehdi Moini and colleagues at the Smithsonian Institution point out that for thousands of years, [silk fibers](#), consisting of [natural protein](#) unwound from the cocoons of the silkworm, have been woven into not just garments, but wall hangings, tapestries, carpets and painted silk

artworks. Until now, however, there has been no practical scientific way to tell whether a silk tapestry is a well-preserved example from the Fontainebleu series from the 1540s or a copy made just last week. In many cases, scientists could not use the familiar carbon-14 dating process, because it involves taking samples of material large enough to cause visible damage to the silk object.

Their solution is a new test that tracks time-related deterioration the amino acid building blocks in [silk protein](#). As silk ages, the so-called L-amino acids in its protein changed into so-called D-amino acids. The D/L ratio provides a highly accurate measure of a silk object's age, age to within 50-100 years and whether it is deteriorating and needs conservation work. Archaeologists had used the D/L approach to date ancient teeth and bone, but Moini's team simplified it and adapted it for silk. The researchers demonstrated the test, called "CE-MS," on Sheridan's flag, a Fontainebleu tapestry, ancient silks from China and other old samples from masterpieces in museums around the world. The method only takes 20 minutes and requires only microscopic samples of silk -- a major improvement over the familiar carbon-14 dating method, which requires large samples that may cause visible damage to the object.

More information: Dating Silk By Capillary Electrophoresis Mass Spectrometry, *Anal. Chem.*, 2011, 83 (19), pp 7577–7581. [DOI: 10.1021/ac201746u](https://doi.org/10.1021/ac201746u)

Abstract

A new capillary electrophoresis mass spectrometry (CE-MS) technique is introduced for age estimation of silk textiles based on amino acid racemization rates. With an l to d conversion half-life of 2500 years for silk (*B. mori*) aspartic acid, the technique is capable of dating silk textiles ranging in age from several decades to a few-thousand-years-old. Analysis required only 100 μg or less of silk fiber. Except for a 2 h acid

hydrolysis at 110 °C, no other sample preparation is required. The CE-MS analysis takes 20 min, consumes only nanoliters of the amino acid mixture, and provides both amino acid composition profiles and d/l ratios for 11 amino acids.

Provided by American Chemical Society

Citation: First practical scientific test to date and authenticate priceless silk masterpieces (2011, October 12) retrieved 18 May 2024 from <https://phys.org/news/2011-10-scientific-date-authenticate-priceless-silk.html>

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