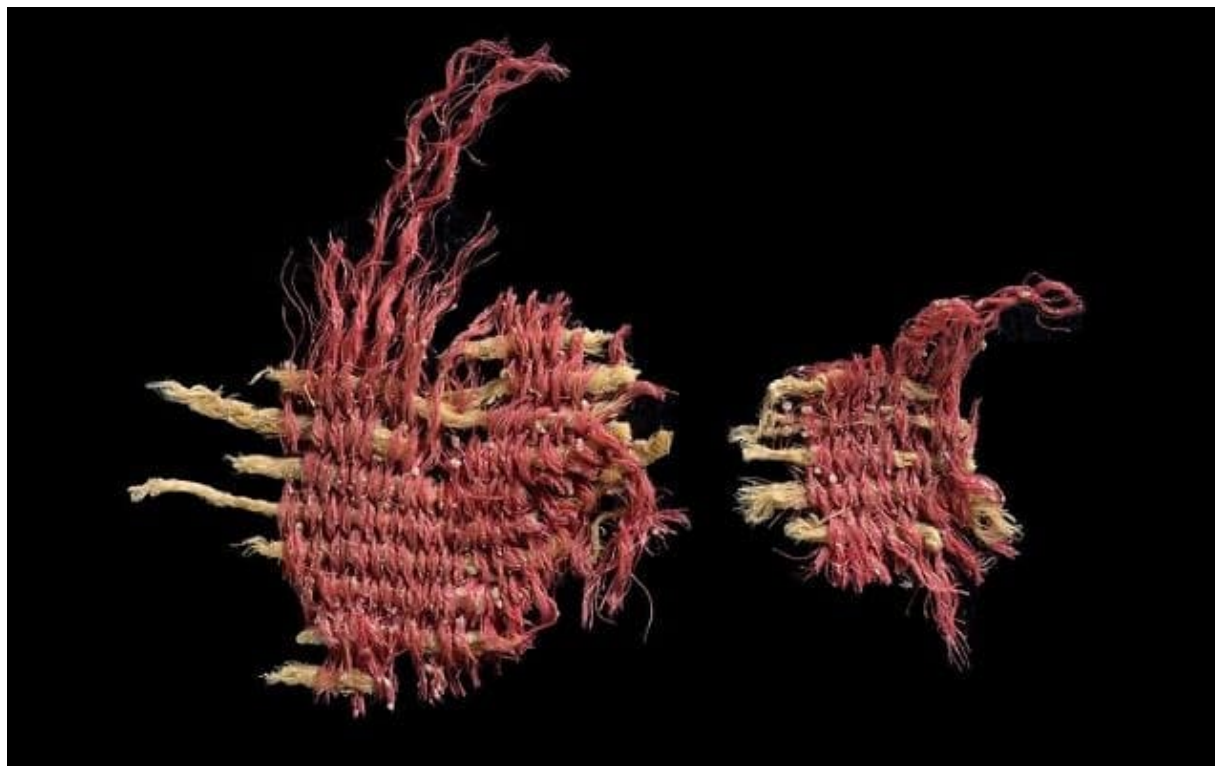


# Tiny 3,800-year old textile found in Israel was dyed with biblical 'scarlet worm'

Ancient sources reference use of scale insects for red dye, but examples from before Roman period are sparse; new find 'bridges the gap' between written sources and found artifacts

By **TOI STAFF**

18 July 2024, 7:21 pm



A fragment of a rare 3,800-year-old textile, dyed with the Kermes vermilio insect. (Dafna Gazit, Israel Antiquities Authority)

Israeli researchers have confirmed that a 3,800-year-old scarlet-red textile found in the Judean Desert in 2016 was dyed using a tiny insect referred to throughout ancient sources, according to an article published this week in the *Journal of Archaeological Science*.

The peer-reviewed study was a joint effort of Hebrew University, Bar-Ilan University and the Israel Antiquities Authority, researchers said in a press release.

Archaeologists discovered the piece of textile, less than 2 centimeters (about a half-inch) across, in the so-called "Cave of Skulls" in the Tze'elim Stream near Masada, during a joint excavation to save heritage finds from antiquities theft in 2016.

Researchers were struck by the textile's dark-red color.

Scientists carbon-dated the artifact to the Middle Bronze Age (20th-18th centuries BCE), and employed high-performance liquid chromatography (HPLC) — a technique used to identify the ingredients of mixed solutions— to trace the origin of the dye to a scale insect called *Kermes vermilio*.

The crimson bug, found throughout the Mediterranean region but not in Israel itself, is probably the same "scarlet worm" (*tola'at hashani*) mentioned 25 times in the Bible, often next to mentions of blue (*techelet*) and purple (*argaman*), considered the most precious and prestigious colors in the ancient world.



Kermes vermilio insects used in the ancient world for producing red dye. (Dr. Naama Sukenik, Israel Antiquities Authority)

In the Bible, the Israelites are commanded to use the “scarlet worm” to dye the fabrics of the Tabernacle and the priestly garments.

“In ancient times, the dye was produced from the female scale insect, which lives on the kermes oak tree (*Quercus coccifera*),” Na’ama Sukenik of the Israel Antiquities Authority explained in a press release.

“Collecting these kermes was done in a very short window of time — one month of the year, in the summer, after the female had laid her eggs but before they hatched — when the amount of dye was greatest,” Sukenik said.

Though references to dyes made from scale insects abound in ancient sources, very few textiles dyed with the creatures have been found that predate the Roman period.

The tiny textile is the earliest evidence of the technique ever discovered, and “bridges the gap between written sources and the archaeological discoveries,” Sukenik said.

Sukenik noted that Israel is home to a different scale insect, which lives on Palestinian oak trees (*Quercus calliprinos*) and can produce a red-orange color.

She said the fact that the particular species of scale insect used in this textile isn’t found in Israel points to the existence of “broad international commercial networks already functioning at this time, and indicates the presence of an elite society.”