

For centuries these dazzling Roman bowls were misread—until chemical traces exposed an unexpected maker

April 29 2026, by Sayan Tribedi



Examples of mosaic objects analyzed: (a–c) fragments of plaques and inlays from Egypt; (d–g) fragments of mosaic vessels. Credit: Liam Richards et al, Origins of early Imperial Roman fused mosaic glass, *Journal of Archaeological Science* (2026). DOI: 10.1016/j.jas.2026.106574

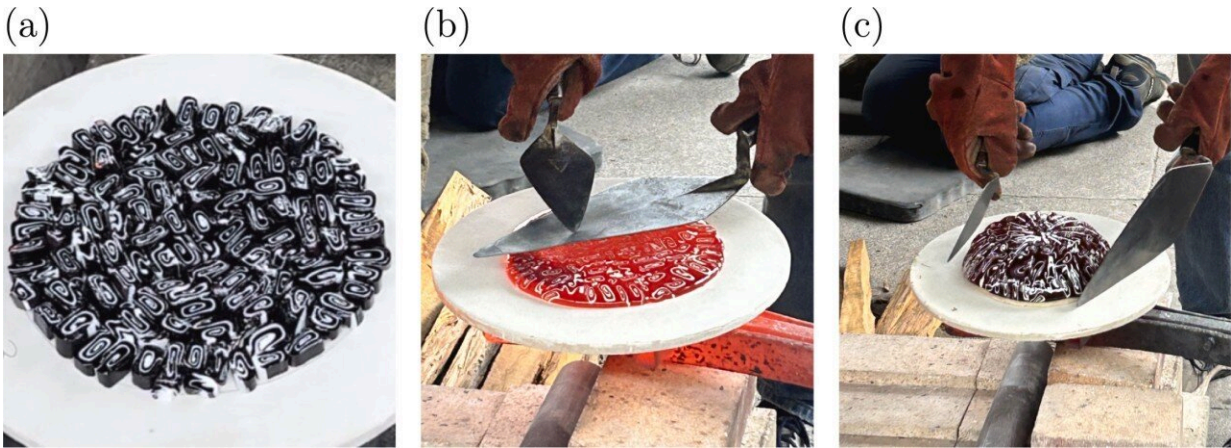
For centuries, archaeologists debated the origins of Rome's exquisite mosaic-glass bowls. Now, chemical fingerprints in 101 ancient shards point to a surprising center of production: Italy, not Egypt. This discovery challenges long-held assumptions about ancient Roman craftsmanship and trade.

These mosaic glass bowls (1st c. BCE/CE) were formed by arranging multicolored glass rods (canes) into a flat disk and "slumping" it over a mold. Such twisting, swirling patterns first appeared in the late Hellenistic period (around 150 BCE) in the eastern Mediterranean. The bowls were luxury items prized across the empire—but exactly where they were made remained a mystery for archaeologists.

Luxury by hand

Roman artisans produced these bowls by hand, and the process left no tag for modern eyes. Conservators found that glassworkers would arrange patterned canes side by side and fuse them on a plate, then reheat the disk so it sagged into a bowl shape. The rim often has a ribbed, everted edge created by a special mold press.

In effect, each bowl is a handcrafted mosaic in glass. These exotic vessels show up in excavation finds from Egypt to Italy to Syria, yet ancient texts do not record their workshops. In general, scholars knew that most Roman glass was made in massive factories in Egypt or Palestine. But without direct evidence, experts could only guess whether Italy had its own workshop for these early slumped bowls.



General process for making a mosaic glass vessel: (a) Arranging sections of canes in a disk; (b) slowly fusing the cane sections together; (c) slumping the disk over a ceramic form. Credit: Liam Richards et al, Origins of early Imperial Roman fused mosaic glass, *Journal of Archaeological Science* (2026). DOI: 10.1016/j.jas.2026.106574

Glass under the microscope

Today's science provides the answer camouflaged within chemistry. In a new study [published](#) in the *Journal of Archaeological Science*, researchers collected 101 mosaic glass fragments from museum collections and analyzed the chemical compositions of 58 elements in them using laser ablation ICP-MS. This advanced methodology revealed that the glass falls into distinct compositional categories based on the sand used to make it.

There are two main types of glass, the analysis shows. The first category, which represents almost half of the samples, showed a chemical signature consistent with possible Egyptian sand sources. Thus, this glass had high concentrations of heavy minerals, particularly titanium dioxide (TiO_2), zirconium dioxide (ZrO_2), hafnium dioxide (HfO_2), niobium

pentoxide (Nb_2O_5), and thorium dioxide (ThO_2)

In this Egyptian grouping, the researchers found two distinctly related varieties. One, which consisted of around 30 samples, was an older formulation, likely derived from the Hellenistic. The other variety was slightly different, comprising around 20 samples and containing plant ash, indicative of later production.

The other half of the collection of about 50 samples matched with the Levantine coast (present-day Israel and Lebanon) chemistry.

This glass was distinctive for its unusually high aluminum oxide (Al_2O_3) and rare-earth elements (REEs), but, unlike the Egyptian samples, did not contain any heavy minerals in high quantities. With the identification of the "sand fingerprints," the researchers were finally able to ascertain the exact source of the raw material for each lavish bowl. In other words, a glass tells us where it was made based on its composition.

Remarkably, the context of each shard lined up with this chemistry. According to the research, "Fused mosaic plaques and vessels found in Egypt were made almost exclusively using Egyptian glass."

Elsewhere, the results were mixed: some vessels were pure Egyptian glass, others pure Levantine, and some contained both types. Bowls containing [both glass types](#) could only have been assembled in a place that imported raw material from both regions. In short, the chemical detective work showed that something unusual was happening outside the eastern Mediterranean.

Italy's hidden workshops

The only region that fits the puzzle is Roman Italy. As the researchers conclude, "The compositional data support the view that early Roman

slumped mosaic bowls were predominantly manufactured outside the eastern Mediterranean, probably in Italy."

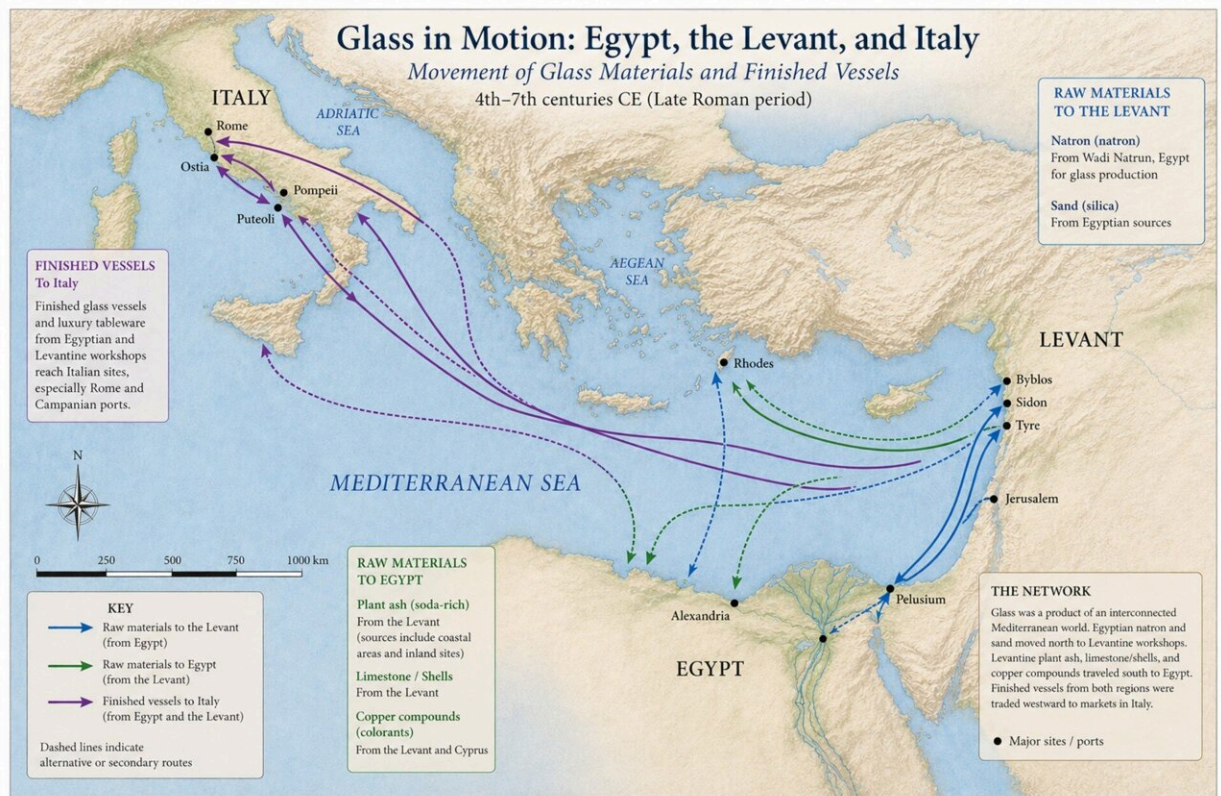
In other words, these luxury bowls seem to have been assembled in Italian workshops using colored canes made from Egyptian and Levantine glass. This is the first strong analytical evidence pointing to an early Roman glass studio in Italy.

One scientist involved notes that earlier evidence of Italian glassmaking was scant, so this multi-source glass is a compelling clue. For example, an elaborate bowl found on the Bay of Naples and labeled "Roman, probably Italian" now has a chemical story: it was made in Italy from eastern glass.

A Mediterranean trade web

The global market is pushed towards higher-quality craftsmanship. Mosaic glassware that was sold by the elite sector of the Romans was sophisticatedly crafted by the Italians. Moreover, it was made even more enticing by the colorful, fine sands from Egypt and Syria.

Museums and archaeologists can follow every shard's journey. Through the analysis of a fragment's chemistry in relation to known groups, curators can determine the source of the raw glass and, therefore, the likely origin of its manufacture. The discovery alters our perception of ancient trade, as these bowls present an Italian center for luxury goods, rather than a reigning exotic import only from Alexandria.



Map illustrating the movement of glass materials and finished vessels between Egypt, the Levant, and Italy during the Late Roman period (4th–7th centuries CE). It shows the export of raw materials such as natron, silica, and limestone from Egypt to Levantine and Italian production centers, alongside the redistribution and trade of finished glass vessels across the Mediterranean. Generated by the author using AI models for illustrative purposes

In summary, the shards have spoken: Egypt supplied the glass, but Italy likely bore the flame. The researchers state that the vessels were used elsewhere (principally in Italy) and have a mix of the two sources. What now remains is finding the actual furnace—archaeologists are on the lookout for the Mediterranean workshop where the true meeting of East and West in glass occurred.

More information: Liam Richards et al, Origins of early Imperial Roman fused mosaic glass, *Journal of Archaeological Science* (2026).
[DOI: 10.1016/j.jas.2026.106574](https://doi.org/10.1016/j.jas.2026.106574)

© 2026 Science X Network

Citation: For centuries these dazzling Roman bowls were misread—until chemical traces exposed an unexpected maker (2026, April 29) retrieved 29 April 2026 from
<https://sciencex.com/news/2026-04-centuries-dazzling-roman-bowls-misread.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.