

A unique pre-Columbian manuscript and the mystery behind its colors

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The Nahuatl (i.e. "Aztec") divinatory manuscript, also known as Codex Cospi, represents a rare example of a pre-Columbian "book". Credit: Luca Sgamellotti

The Codex Cospi is one of the few Aztec 'books' in the world and it is kept at Bologna University Library. A new research project will

investigate with unprecedented detail the painting techniques and tools with which it was made.

There are very few pre-Columbian manuscripts in the world; the Codex Cospi is one of them. These days, this manuscript is being analyzed at Bologna University Library in collaboration with Palazzo Poggi Museum (University Museum System). Using cutting-edge non-invasive techniques, researchers will try to figure out the composition of the bright colors with which the codex was embellished between the end of the 15th century and the beginning of the 16th.

Carisbo Foundation provided the funding (Art and Culture grant) to the Department of History, Cultures, and Civilization of the University of Bologna. Thanks to this funding, these analyses will be carried out exploiting the MOLAB platform.

"We will employ fluorescence and [hyperspectral imaging](#) techniques to map the distribution of compositional material (both organic and inorganic) on every page of the manuscript," says Davide Domenici, Professor at the University of Bologna and head of the project. "The level of detail these techniques are able to provide is unprecedented and will shed new light on the pictorial and technological practices developed by pre-Columbian artists."



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The Nahuatl (i.e. "Aztec") divinatory manuscript, also known as Codex Cospi, represents a rare example of a pre-Columbian "book." Very few of these "books" made it through the centuries and survived the destructive madness of conquerors and evangelizing missionaries. For this reason, the Codex Cospi exemplifies an entire book heritage largely doomed to oblivion. The manuscript came to Bologna thanks to Domingo de Betanzos, a Spanish Dominican friar, who probably brought the Codex to this city on the occasion of his meeting with Pope Clement VII on March 3, 1533. Since then, this precious book was kept in

Bologna, initially as part of the Ferdinando Cospi collection. Then, it entered the collection of the Academy of Science, and finally it got to the University Library, where it found its definitive location.

In 2006, researchers carried out a first non-invasive analysis on the Codex. This was a pioneering experiment as far as pre-Columbian manuscripts are concerned. From that first experience, the researchers involved (Davide Domenici, Antonio Sgamellotti, Costanza Miliani) started analyzing most of the existing pre-Columbian manuscripts around the world currently kept in institutions like the Museo de América in Madrid, the British Museum in London, the World Museum in Liverpool, Oxford's Bodleian Library and the Vatican Apostolic Library. 15 years later, advances in technology have made it possible for researchers to use cutting-edge imaging techniques to better understand Aztec writing and drawing skills.

This round of analyses on the Codex exploits the MOLAB platform, which is developed by E-RIHS.it, the Italian node of the European Infrastructure for Heritage Science. This project involves a team of researchers from the Scientific Methodologies Applied to Archeology and Art (SMAArt) Center of Excellence of the University of Perugia, National Research Council's Institutes of Chemical Sciences and Technologies "Giulio Natta" (SCITEC-CNR) and of Heritage Science (ISPC-CNR) under the joint guidance of Laura Carthechini (SCITEC-CNR) and Aldo Romani (SMAArt).



The research team will analyze the Codex Cosp using a macro-XRF scanner, and it will also get through hyperspectral imaging in the visible range. Credit: Luca Sgamellotti

The research team will employ a macro-XRF scanner. This tool uses X-rays to examine the elemental composition of the object under investigation. Once the distribution of chemical elements is known, it will be possible to identify the pigments composing those elements. In this way, researchers will be able to retrieve the distribution of orpiment (a deep-yellow mineral pigment) by looking for arsenic which is the element composing this pigment.

The Codex Cospi will also get through hyperspectral imaging in the visible range. This method allows to study how visible light is absorbed,

reflected, and emitted. Some [chemical compounds](#) may present peculiar light absorption, reflection, emission, and hyperspectral imaging that can map their distribution. In particular, through hyperspectral imaging researchers can map the use of organic dyes such as indigo, which was used together with specific clays in the production of the famous Maya Blue.

Provided by Università di Bologna

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