

## Related to the famous Maya blue: Indigo compounds give Mayan art their yellow color

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(PhysOrg.com) -- For the Maya, blue was the color of the gods. For ritual purposes, art objects, and murals, they used Maya blue, a pigment without equal with regard to boldness, beauty, and durability. Maya blue is made of indigo embedded in a special clay mineral called palygorskite.

A team led by Antonio Doménech at the University of Valencia (Spain) has now discovered that some Mayan yellow pigments are based on similar components. As the scientists report in the journal *Angewandte Chemie*, the Maya appear to have developed a preparative technique that

was not limited to Maya blue and anticipated modern syntheses of organic–inorganic hybrid materials.

Maya blue is so fascinating because it has a special brightness and a singular color that can range from a bright turquoise to a dark greenish blue. Does the color stem from a unique organic component, a unique linking of the molecules, or a unique production process? Doménech and his team tested these hypotheses. They surmise that the hue is determined by the ratio of indigo to dehydroindigo, the oxidized form. This ratio depends on how long the Maya heated their formulation. This would allow for the formation of different variations of the addition compound formed by the indigo compounds and the mineral. The researchers further conjecture that the Maya were also able to produce yellow and green pigments from indigo-based pigments.

By means of various spectroscopic and microscopic methods, as well as voltammetry -- a special electrochemical process that allows for the identification of pigments in micro- and nanoscale samples from works of art—the scientists examined a series of yellow samples from Mayan murals from different archaeological sites in the Yucatán (Mexico). The results confirm that a whole series of yellow pigments from Mayan mural paintings are made of indigoids bound to palygorskite. The researchers also found ochre.

Doménech and his co-workers think it very likely that the preparation of such “Maya yellow” pigments was an intermediate step in the preparation of indigo and Maya blue. Leaves and branches from indigo plants were probably soaked in a suspension of slaked lime in water and the coarse material filtered out. A portion of the yellow suspension could then be removed and added to palygorskite to make Maya yellow. The remaining suspension would then be stirred intensely and ventilated until it took on a blue color. It was then filtered and dried to obtain indigo for use as a dye. It could also be ground together with palygorskite and

heated to produce [Maya](#) blue.

**More information:** Antonio Doménech, From Maya Blue to "Maya Yellow": A Connection between Ancient Nanostructured Materials from the Voltammetry of Microparticles, Angewandte Chemie International Edition, [dx.doi.org/10.1002/anie.201100921](https://doi.org/10.1002/anie.201100921)

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