

ARTFUL SCIENCE

TechNArt CONFERENCE celebrates how science answers questions about our most precious pieces of cultural heritage

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THE SECOND SON born to an affluent family in 16th-century Sicily couldn't inherit land, so he was given a choice: Join the army, or become a monk. Those who chose monkhood lived at the richly ornate Benedictine Monastery of San Nicolò, in Catania, Italy, also the site of last month's TechNArt conference. The 500 attendees basked in a wealth of talks and posters about how science answers questions about the history, provenance, authenticity, and preservation of art and artifacts, from ancient fossils to 20th-century masterpieces. Here's just a taste of the research presented at TechNArt. Visit <http://cenm.ag/technart> for a full meal. **& MORE ONLINE**



NATIONAL GALLERY OF ART, WASHINGTON, D.C.

▲ Pollock's Calculated Chaos

The splotches and streaks of color that make Jackson Pollock's artwork so distinctive can seem like a catharsis enabled by large volumes of paint. But Pollock would have disagreed. "I can control the flow of paint. There is no accident," he said in 1950, six years before he died and left behind little information about how he painted chaos so intentionally. Scientists have since searched for logic in his anarchistic artwork, for example, by using fluid dynamics calculations to figure out his paint-flinging technique. John K. Delaney and his colleagues at the National Gallery of Art, in Washington, D.C., have now found further evidence of deliberate disorder in Pollock's masterpieces. Using hyperspectral reflectance imaging spectroscopy, they've identified paint binders—the stuff in which pigment is suspended—on every part of "Lavender Mist" (shown). Delaney's team found that when Pollock wanted to make thick, textured streaks, he used oil as a binder, and for the less viscous splotches, he opted for an alkyd resin. Who knew the chemistry would be so clear-cut in that chaos?

▼ From Meiji Prints To Manga

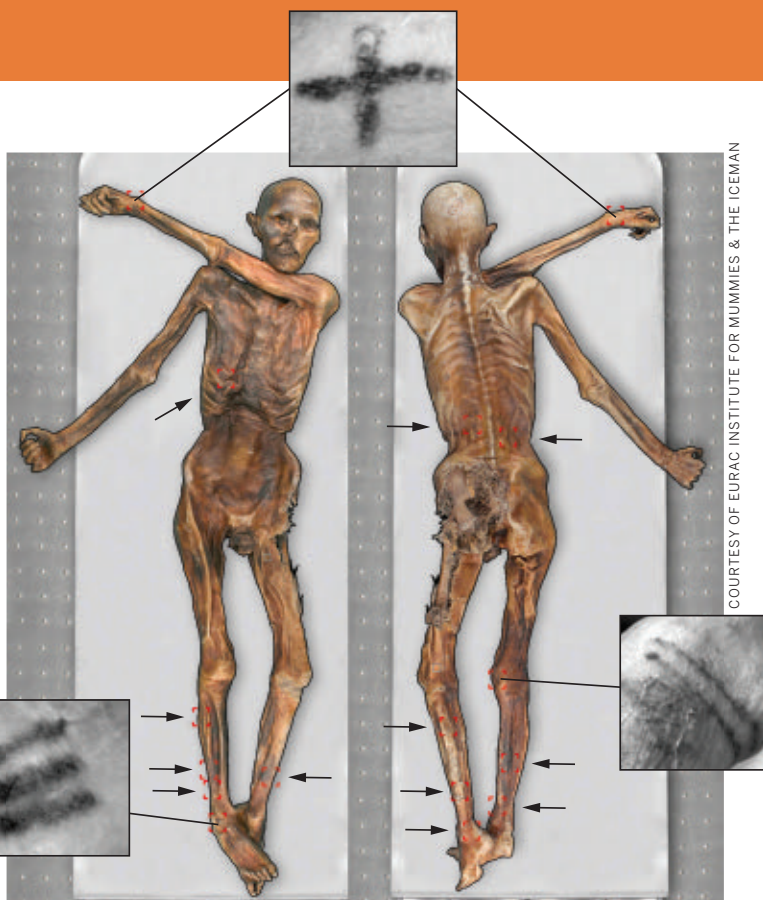
Created by Japanese artists for centuries, traditional woodblock prints are the epitome of tranquility, with landscapes featuring distant mountains, still waters, and quiet skies. At the turn of the 20th century, however, bright, garish colors began to appear on the prints (below, left), ushering in the Meiji era. Harmonious panoramas were replaced with brutal fighting scenes or depictions of tawdry current events, such as police raiding a brothel (below, right). These widely distributed caricatures "were that era's version of a trashy newspaper," explained Marco Leona, a conservation scientist at the Metropolitan Museum of Art, in New York City. Leona and his colleagues have used an array of analytical techniques to investigate the bright pigments used in Meiji-era prints. And the researchers have found that the pigments include synthetic dyes from Europe, including rosaniline and eosin. "The Meiji era was a time of great tumult and revolution," Leona explained. Japan opened up its borders for the first time to outside influences, including dye merchants from Europe. "Inside their suitcases was a rainbow of colors," he said. At the time, Japanese art purists decried the use of these pigments as the end of traditional woodblock printing. But their use helped establish the now-legendary style of manga graphic novels.



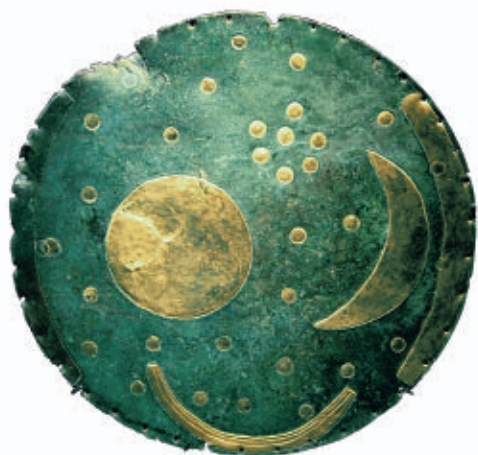
COURTESY OF HENRY D. SMITH II

Close-Up Of The Iceman's Ink ▶

In the nearly 20 years since hikers in the Alps discovered a 5,300-year-old frozen mummy, scientists have found that this ancient mountain man, nicknamed Ötzi, suffered from arthritis, reduced fertility, a stomach parasite called whipworm, several cavities in his teeth, at least three broken ribs, an arrowhead in his shoulder, and head trauma. Turns out Ötzi was also heavily inked: Some 61 tattoos (see arrows) in 15 groupings adorn his body, said Marco Samadelli of the European Academy of Bozen/Bolzano's Institute for Mummies & the Iceman, in Bolzano, Italy. Samadelli mapped the iceman's ink using multispectral photographic imaging. Most of the body markings are located near joints, which suggests the tattoos may have been part of a medical treatment for arthritis, Samadelli said. The team has also analyzed the ink: The black markings are carbon based, most likely made with plant-derived soot.



COURTESY OF EURAC INSTITUTE FOR MUMMIES & THE ICEMAN



▲ X-Rays Analyze Ancient Skies

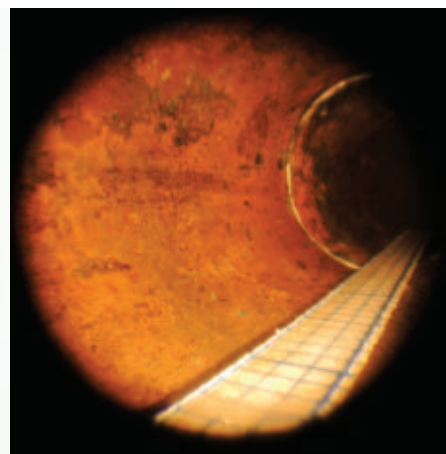
Designed around 1600 B.C., "The Nebra Sky Disc" is the only representation of the cosmos from prehistoric Europe. Its 13-inch-wide bronze base is inlaid with gold representations of celestial bodies, including the Pleiades constellation, the moon, and what is thought to be a solstice (depicted by several curved gold bands). After resting underground in the German countryside for nearly 4,000 years, the disk was dug up by looters in 1999, sold on the black market, then retrieved in an international sting operation two years later. It now resides at the State Museum of Prehistory, in Halle, Germany. Martin Radtke of the Federal Institute for Materials Research & Testing, in Berlin, has also played host to the disk, focusing synchrotron radiation on the gold inlays to learn about their purity and trace elements. These analyses revealed that the gold decorations were added in various stages during the disk's fabrication; in particular, the curved bands that surround the disk were added last. Additional work revealed that the gold originated from Cornwall, an example of early European trade between Germany and England.

WIKIMEDIA COMMONS

▼ Breathing New Life Into Historic Instruments

Ending up in a museum is a bittersweet fate for musical instruments: On the one hand, they've been played by a famous musician or during a historical performance; on the other, no musician can ever play them again, thus negating their *raison d'être*. "It's a question of museum ethics," because playing a musical instrument can exacerbate its destruction, explained Bernhard Elsener of the Swiss Federal Institute of Technology (ETH), Zurich. In the case of a brass instrument, a musician's hot, wet breath could worsen the instrument's interior corrosion, as seen in this tuba, which was played at the 1913 world premiere of Igor Stravinsky's "The Rite of Spring" in Paris. The radical, avant-garde composition caused a riot, ending its inaugural performance. Yet the music paved the way for modern musical composers. Using electrochemical techniques, Elsener found that evacuating historical brass instruments made of copper-zinc alloys with hot, dry air after a musician plays them helps to halt further interior corrosion (below, right). This illustrious tuba may stage a musical comeback yet.

HOCHSCHULE DER KÜNSTE, BERN, SWITZERLAND



COURTESY OF BERNHARD ELSENER