

European Commission news headlines on the broader subject of research and scientific activities.

PROJECT, RESEARCH

EU scientists are all over the degrading ink case

Valuable artefacts like da Vinci’s drawings, or paintings by Michelangelo and Rembrandt are under threat from corrosive properties in a certain type of ink. Now scientists, united in an EU-funded research project called InkCor, have developed an effective antidote that will help save these precious works of art.

Scientists have known for some time that alkalies need to be added to paper to combat decay induced by acids contained in some inks. The InkCor team took this one step further by isolating exactly which type of antioxidants slow the degradation. In fact, its treatment proved to prolong the lifespan of paper containing corrosive inks by more than ten-fold.

“We first needed to establish what the inks were really made of and identify the main corrosive ingredients,” explains project coordinator Jana Kolar of the Slovenian National and University Library. “Only then could we develop a suitable solution.”

Art historians in the InkCor project set about collecting and analysing a number of historical recipes. Iron gall inks were widely used from the Middle Ages until the 20th century and their corrosiveness was believed to be caused by the acids and iron ions in the ink. This problem was first documented in 1899 in St Gallen, Switzerland. Despite advances in recent years – notably, development of an aqueous stabilisation treatment – progress has been slow in this complex field due to the multitude of ink recipes concocted in ateliers and private houses all over Europe.

Drawing on everyday objects found around the house, historical recipes did, however, share common colour-forming ingredients – wood sap, steel filings, tea, etc. The team poured over old manuscripts citing how to elicit certain colours using sulphates and other elements. The effort paid off. The researchers discovered discrepancies which eventually led them to the current anti-corrosion solutions.

“This was an important finding,” stresses Kolar. “We know that similar damage to that caused by iron gall ink is inflicted upon paper and parchment documents by verdigris – a dark blue green basic copper acetate – often found in old illustrations and maps.” Noting large amounts of corrosive metal ions other than iron in the ink significantly changed the way the team would later attempt to stabilise these materials.
Soft touch
But a lot of work was still ahead of the team. The chemists and physicists in the project followed up the art historical studies by investigating the inks in numerous historical documents using sophisticated gentle nuclear acceleration techniques, such as proton-induced X-ray emission, suitable for analysing fragile artefacts.

The results were surprising. Not only did they find that, in addition to iron, several other metals were present in various quantities in the ink, but some, like copper, were many times more destructive to paper than iron. This, they suspected, could be the main source of decay set off by certain iron gall inks.

Having pinpointed the metals and acids responsible for the corrosion, the InkCor group started developing a non-aqueous stabilisation treatment, which contained alkalies. Patents have been filed for the resulting treatment. Meanwhile, the new stabilisation method could help save hundreds of master drawings and shelves full of works containing iron gall ink.

The InkCor project, funded by the EU’s Fifth Framework Programme (City of Tomorrow and Culture Heritage Key Action), which developed the new treatment for corrosive inks will present its findings at next month’s prestigious BA-Festival of Science in Dublin (IE). The British Association for the Advancement of Science (BA) is a UK-wide organisation dedicated to connecting science with people.