



An exhibition is under way in Xi'an, capital of Shaanxi province, to show the progress researchers have made in retaining the colors of the Terracotta Warriors. PHOTOS BY XINHUA / FOR CHINA DAILY

# Warriors reveal their true colors

Exhibition in Xi'an shows how researchers are preserving the original appearance of some of China's most precious relics

By XINHUA

**F**our minutes. That is all it takes for the rarest colors on Earth to fade. Han blue and Han purple, also known as Chinese blue and Chinese purple, are made of synthetic barium copper silicate.

The pigments were first used in paint in the Qin Dynasty (221-206 BC), and in large quantities on the Terracotta Warriors unearthed from the tomb of Emperor Qinshihuang, China's first emperor, who lived between 259 BC and 210 BC.

"Almost every warrior and horse was painted, but after more than 2,200 years, the pigments were so old they began to change just 15 seconds after they were unearthed. Within four minutes the lacquer layers that were bound with the pigments broke from the surface," said Xia Yin, director of the relics protection department at Emperor Qinshihuang's Mausoleum Site Museum.

"Before the artifacts were unearthed, they were protected by a cooler and more humid underground environment," said Xia, who has spent more than 20 years researching them.

The life-size clay figures were first discovered in 1974 in the underground mausoleum, the world's largest. But there were no advanced techniques to properly protect the warriors at that time.

"Photographers did not have the time to take a picture before the paints began to disappear," Xia said.

For the past 20 years, Chinese researchers have collaborated with German scholars on preserving colors on pottery.

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The life-size Terracotta Warriors were first discovered in 1974 in the tomb of Emperor Qinshihuang. PHOTOS BY XINHUA



An employee paints pigments on a Terracotta Warrior's head.

Shaanxi province, where the mausoleum is located, to show the progress researchers have made in retaining

the colors of the excavated artifacts. It started on Aug 30 and will last for three months.

mausoleum, there are more than 10 colors for the terracotta figures, including scarlet, pink, green, jujube red, azure, pink-purple and reddish brown.

"The colors on the surface of Terracotta Warriors show vibrancy and liveliness in the emotions of the Qin people. It is definitely not one of sadness or low spirit," said Yuan Zhongyi, a senior archaeologist and retired curator of the museum.

The first excavation began on Pit No 2 in 1994. Nearly 8,000 life-size warriors and horses, along with tens of thousands of pieces of weaponry, have been uncovered in three pits.

Hou Ningbin, curator of the museum, explained how the sculptures were carefully handled.

"We sprayed an antiseptic substance on the layers once the warriors were unearthed, wrapped them with plastic membranes to keep them humid, and had skilled workers clean the surfaces and work on them in labs."

The new techniques can keep the paint stable for more than 10 years, he added.

"Now visitors can see for themselves the scarlet hair bands, pink faces, scarlet lips, purple robes and pants of the warriors. They can also visit our digital museum to explore the vividness of colors on the warriors."

Hou explained that the excavated part of the mausoleum is only about 1 percent of the total.

"What we know is the tip of an iceberg. Many more things remain buried underground, but we'd rather them remain as they are now, because we may not be technically ready to protect them yet," he said. "The world of colors down below is still a mystery, and we need to be patient."

No written records have been found on the production of Han purple and Han blue. The rare paints were used on pottery, murals and tomb artifacts during the Western Zhou Dynasty (c 11th century-771 BC) and continuing until the end of the Eastern Han Dynasty (AD 25-220). However, since then they have disappeared.

"Synthetic barium copper silicate is made from azurite, barite, quartz and other minerals heated together to a temperature of around 1,000 C," Xia said. "We can try to make the pigments in labs, but it is a very difficult technique, even today."

The paints were bound to the surface with lacquer, symbolizing luxury and status. They were used by emperors and noble families.

Overall, in the Qinshihuang