

# Technicolor stores Hollywood history in a bottle

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A vial containing a few droplets of water—and one million copies of an old movie encoded onto DNA—is displayed during a media tour at Technicolor's Sunset Boulevard studios in Hollywood

A Technicolor scientist surrounded by the latest virtual reality technology inspects a vial containing a few droplets of water—and one million copies of an old movie encoded into DNA.

The company has come a long way since the Hollywood golden age, when the world gazed in awe at the lush palette of "The Wizard of Oz" and "Gone with the Wind" provided by its three-strip cameras.

Now celebrating its centenary year, Technicolor's laboratories are at the cutting edge of the science of filmmaking, leading a worldwide revolution in immersive entertainment.

"We are bigger today in LA than we were 70 years ago or 50 years ago," Technicolor chief Frederic Rose said at a recent ceremony where he accepted a "star of recognition" from the Hollywood Chamber of Commerce.

Rose used the occasion at Technicolor's Sunset Boulevard studios to showcase the company's latest jaw-dropping innovation—the encoding of movies into artificial, "non-biological" DNA.

Jean Bolot, vice-president for research and innovation, held up a vial barely bigger than a bullet containing a million copies of 1902 French silent film "A Trip to the Moon," the first movie to use [visual effects](#).

DNA is almost unimaginably small—up to 90,000 molecules can fit into the width of one human hair—so even such a large library is totally invisible to the human eye. All you can see is the water in the tube.



Technicolor CEO Frederic Rose attends a ceremony honoring the company's 100th anniversary, in Hollywood

"This, we believe, is what the future of movie archiving will look like," Bolot said.

Scientists have been experimenting with DNA as a potential storage medium for years but recent advances in modern lab equipment have made projects like Technicolor's a reality.

The company's work builds on research by scientists at Harvard University, who in 2012 successfully stored 5.5 petabits of data—around 700 terabytes—in a single gram of DNA, smashing the previous DNA data density record by a factor of one thousand.

## **Oscars glory**

DNA is a long, coiled molecular "ladder"—the famous double helix structure—comprising four chemical rungs, adenine, cytosine, guanine and thymine, which team up in pairs.

Bolot's team digitized the "A Trip to the Moon" into data in the form of zeros and 1s in computing's binary code, and transcribed it into DNA code, which was then turned into molecules, using lab-dish chemicals.

The contents are "read" by sequencing the DNA—as is routinely done today in genetic fingerprinting—and turning it back into computer code.

Converting movies into man-made DNA brings huge advantages, said Bolot, who points out that the archives of every Hollywood studio, currently taking up square kilometers of floor space, could fit into a Lego brick.

Another problem overcome by DNA storage is that the format for reading it doesn't become obsolete every decade or so, unlike celluloid, VHS, DVD and every other medium in the history of filmmaking.



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"If I gave you a movie in the form of these floppy discs from the beginning of the IBM PC, you would not even know how to read the movie because there are no more floppy disc readers," Bolot said.

"The guys at Harvard told me if you left this (vial) on a hot Arizona pavement with trucks running over it, and you come back in 10,000 years, it will still be readable."

"A Trip to the Moon" took six weeks and tens of thousands of dollars to convert, but Bolot's team is working on streamlining the technology into something that would be genuinely commercially viable.

"We don't know yet if that's going to work but if it does—and we'll know, we expect, within a year—then this will really unlock a new age for archiving," he said.

Founded in Boston in 1915, Technicolor relocated to Hollywood in the early 1920s and has provided post-production on thousands of films across the world.

Its first feature, "The Gulf Between," finished in 1917 in an old converted railroad car, used a two-color technique that photographed a single strip of black and white film with green and red filters.

Spool forward to February this year and Alejandro Gonzalez Inarritu's "The Revenant" became the fifth straight "best cinematography" Oscar-winner color-finished by Technicolor engineers.

Richard Crudo, head of the American Society of Cinematographers and a director of photography on numerous features, has been working with the company's engineers since 1978 and describes them as "outstanding."

## **Virtual reality**

"With the switchover to digital technology there have been a lot of changes and a lot of companies have fallen by the wayside," he told AFP.

"But Technicolor has managed to make the transition very handily and maintain their standards."

Perhaps the most exciting development in entertainment in recent years has been the emergence of sophisticated, hyper-realistic virtual and augmented reality, and Technicolor has been an early adopter, buying up industry-leading studios.

Last year it announced the \$295 million acquisition of The Mill, the world's largest visual effects and content creation studio for the advertising industry.

Technicolor's portfolio also includes leading visual effects company MPC, which worked on Ridley Scott's "The Martian," and previewed the film with a 360-degree [virtual reality](#) flight onto the surface of Mars, via a headset.

It's all a far cry from the two-color printing days, and quite what technologies Technicolor will be developing in another 100 years is anyone's guess.

"You should always go back to the original Star Trek series as a source of inspiration for what's next," Rose, who has been at the helm of the company since 2008, told AFP.

"And if you don't have access to it, you should read one of the Asimov novels for ideas."

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