

Shakespeare's love poems stored in DNA strand by scientists

By [Subodh Varma](#), TNN | Jan 24, 2013, 04:51 PM IST

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NEW DELHI: Shakespeare's sonnets are now available in DNA. So is a 26 second audio clip from [Martin Luther King's](#) famous "I have a dream" speech and a copy of James [Watson](#) and Francis Crick's classic paper on the structure of DNA.

All of this, and more, has been coded by a team of scientists in a tiny bit of DNA. One sonnet of the Bard weighs just a Written in DNA, one of Shakespeare's sonnets weighs 0.3 millionths of a millionth of a gram.

The feat was performed by scientists led by Nick Goldman of the European Bioinformatics Institute (EBI) at Hinxton, UK, located near Cambridge. It was reported yesterday in the scientific journal Nature.

This could mark the beginning of a new age of data storage, which is fast becoming a problem. The world is producing enormous amounts of

digital data every second. One estimate puts the global digital storage at three zettabytes, that is, three followed by 21 zeroes. Conventional storage - in hard drives, discs and magnetic tape - is not only space consuming but also doesn't last very long.

CERN, the European particle-physics lab near Geneva that runs the [Large Hadron Collider](#) (LHC), currently stores around 90 petabytes of data on some 100 tape drives according to Nature. Goldman's method could fit all of those data into 41 grams of DNA.

DNA (deoxyribose nucleic acid) is the chemical compound which contains the [genetic](#) code of life. One gram of DNA could hold as much information as more than a million CDs, the researchers said.

Last year, George Church, a molecular geneticist at [Harvard Medical School](#) in Boston, Massachusetts, encoded a draft of his latest book in DNA.

"I think it's a really important milestone," Church told Nature. "We have a real field now."

Information stored in DNA could last for millennia under cold, dry and dark conditions, according to Goldman quoted in Nature. Readable DNA from long-extinct animals has been recovered and deciphered by scientists recently.

Goldman's team encoded 5.2 million bits of information into DNA, using a complex code in which every byte - a string of eight ones or zeroes - is represented by a word of five letters that are each A, C, G or T. These letters represent the five ingredient bases of which the DNA double helix is made.

After converting Shakespeare's famous sonnets and other material into this code, the scientists emailed it to Agilent Technologies in Santa Clara, California. They used the coding to synthesize the DNA strings and sent it back to the scientists. Goldman and his team were able to completely reproduce everything from the DNA without any error.

The EBI team estimates that it costs around \$12,400 to encode every megabyte of data, and \$220 to read it back. However, these costs are coming down with each passing year. Church says that "the cost of reading and writing DNA has changed by a million-fold in the past nine years, which is unheard of even in electronics", according to Nature.

However, DNA storage still has a long way to go. Creating one megabyte of DNA took these scientists about two days while reading it took two weeks. But as technologies zoom ahead, these

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Nice bit of scientific storage of the poems !

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