FINANCIAL TIMES

January 23, 2013 6:47 pm

Scientists look to DNA for data storage

By Clive Cookson, Science Editor

Genetics may offer the best option for archiving vast amounts of man-made data, according to scientists who have demonstrated a working DNA storage and retrieval system.

A team at the European Bioinformatics Institute in Cambridge developed the new method to meet the huge challenge of storing the deluge of electronic data produced in the digital age. Current technology such as hard drives is expensive and requires an electricity supply, while alternative storage mechanisms, such as magnetic tape and disks, deteriorate over time.

Conceived by scientists Nick Goldman and Ewan Birney over beers in a Hamburg pub, EBI's DNA alternative is both durable and extremely compact.

The EBI team used the chemical letters of a DNA sample – G, A, T and C – to encode the 1s and 0s of several digital recordings. These amounted to almost a megabyte of data, including sound, pictures and text.

The scientists estimate that a cup of DNA, which has evolved over 3bn years to hold genetic information, could store 100m hours of high-definition video.

"We already know that DNA is a robust way to store information because we can extract it from bones of woolly mammoths, which date back tens of thousands of years, and make sense of it," said Dr Goldman. "It's also incredibly small, dense and does not need any power for storage, so shipping and keeping it is easy."

The DNA code was emailed to Agilent, a biotechnology company in California, which turned it into physical DNA molecules and posted the resulting freeze-dried powder back to Cambridge. "The result looks like a tiny piece of dust," said Emily Leproust of Agilent.

Using a DNA reading machine, EBI was able to reconstruct the original digital data with 100 per cent accuracy. The data included Martin Luther King's "I have a dream" speech, a photo of EBI's lab, the text of all Shakespeare's sonnets and Watson and Crick's famous research paper on DNA's "double helix" structure.

Other researchers have previously used DNA to store digital data, including a Harvard University team that encoded a book last year. But Dr Goldman said EBI's system was the first to correct translation errors between the digital and DNA codes, and can also be scaled up for

real archival storage. The results were published in the journal Nature.

Dr Birney and Dr Goldman plan to work towards a commercially viable repository in which a gram of DNA could safely store as much data as a million CDs for more than 10,000 years. Although the practical details are still to be worked out, an archive might store large amounts of data in vials of DNA dust, each with an indexing system encoded in the DNA to help retrieve individual files.