DNA as a repository of information

MT-202

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- Computer data can be transferred to the basis of life itself-DNA. DNA molecules can potentially store the entire volume of the world's digital information — already 1.1 zettabytes (10^21) of data - in about 9 liters of solution for millennia.

18 litre bottle

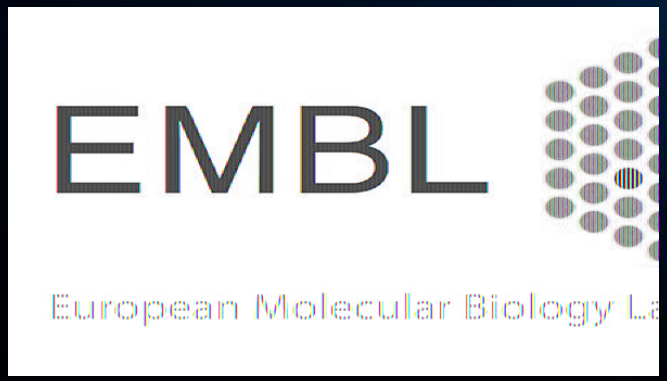
One grain of sand = one exabyte

1 Exabyte = 1073741824 Gigabytes

- The information encoded in DNA in exabytes of data can theoretically be stored in the volume that takes up one grain of sand.

Have people ever done this ?

- Experiments conducted by scientists from the European bioinformatics Institute in Hinkston (England) in 2013 and in 2012 at Harvard, showed that it is possible to store data files in DNA, and then read the information digitally. Based on this work, research teams from the University of Illinois and the University of Washington were able to save four small image files and then restore them using a special file identifier.



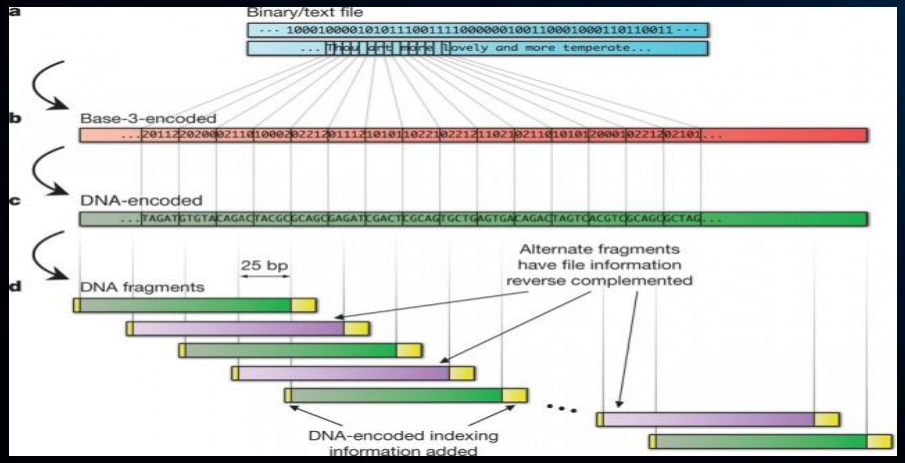
Anyone else?

- In 2016, researchers from Microsoft and the University of Washington managed to do what no one else had been able to do before — record 200 MB of data in the form of a sequence of nucleotides that make up artificially created DNA. It is already quite close to the 750 MB contained in human DNA.

Microsoft

How is data stored in DNA?

- The capacity of DNA was constantly increased by changing the approach : instead of a living cell, a synthetically generated molecule was used , and instead of a Quaternary system, a binary one was used.



Why is it not actively used today?

- Equipment for working with DNA is prohibitively expensive (the cost of encoding information in DNA is estimated at about $ 12,400 per megabyte, the cost of reading - $ 220 for 1 megabyte), but the cost of sequencing or "reading" the genetic code falls faster than the cost of computer memory, and technologies for creating synthetic DNA continue to develop. But another important problem has not been solved — the speed of writing and reading information takes several hours.

Result

- DNA is a great medium for long- term storage. If in the first experiments it was necessary to maintain cold and dryness, then in subsequent experiments the information could be stored at room temperature. And if you add DNA to a quartz ball and store it at -18 °C, the information will be stored for millions of years.

THANK YOU

IT’S ALL