

DNA library

DNA libraries are collections of cloned DNA fragments of a particular organism's genome (cDNA) that are stored inside host organisms (especially bacteria). cDNA (copy DNA, complementary DNA) is obtained by transcription from mRNA using enzyme in reverse transcriptase.

Synthesis of cDNA (complementary DNA)

In addition to reverse transcriptase, synthesis also requires a neutral pH environment, magnesium ions, and all 4 deoxynucleotides. Transcription from mRNA is used because of the presence of **poly(A) ends on which the transcriptase can attach. Before using the cDNA itself, it needs to be converted from a single-stranded form to a double-stranded form using another enzyme - DNA polymerase I. cDNA clones contain only coding sequences.**

Another option for synthesis is the use of the ribonuclease enzyme. The latter is able to recognize the RNA part of the already formed RNA: DNA hybrid, to which it synthesizes the corresponding parts of the second cDNA strand. These parts are used again for DNA polymerase I to mount, the connection of these smaller sections into a single strand is then completed by ligase.

Role of host organisms

Individual DNA fragments are inserted individually into host organisms, which are most often bacteria. The advantage of bacteria is their ability to rapidly replicate a given DNA in a detectable amount. After the multiplication of the given section, individual genes can be recognized. We refer to this gene identification and copying as cloning.

The introduction of genes into bacteria is mediated by means of *plasmids*. Plasmids are a form of vectors. First, their DNA circular structure must be disrupted using restriction enzymes. After insertion of the human fragment, they are joined again by ligase. The result of the whole process is **recombinants**. Recombinants are inserted into bacteria, which begin to synthesize the corresponding fragment of human DNA. The bacteria are then placed in a nutrient-rich medium where they form colonies.

Use of DNA libraries

- propagation of human proteins using bacterial cultures;
- creation of probes that are used for DNA microarray;
- comparing developmental changes in tissues.

Links

External links

- Construction of a DNA Library (<http://www.sumanasinc.com/webcontent/animations/content/dnalibrary.html>)
- Molecular Genetics II - Genetic Engineering Course (Supplementary notes) (<http://dwb.unl.edu/Teacher/NSF/C08/C08Links/www.dur.ac.uk/~dbl0www/Staff/Croy/cDNAfigs.htm>)

References

- cDNA Library (http://www.iscid.org/encyclopedia/cDNA_Library)
- ALBERTS, Bruce – BRAY, D – JOHNSON, A. *Basics of cell biology*. 2. edition. Espero Publishing, 2005. 740 pp. ISBN 80-902906-2-0.