

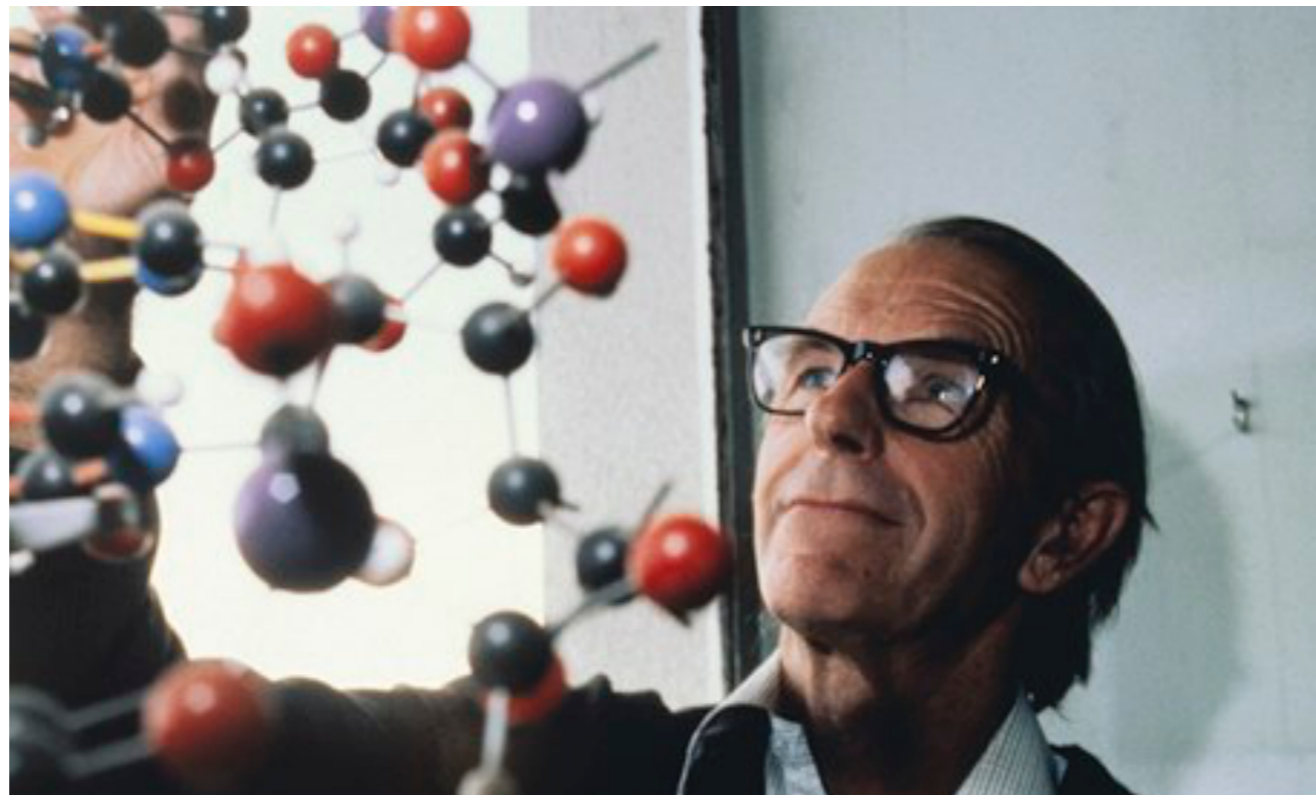
# GENOMIC LIBRARIES

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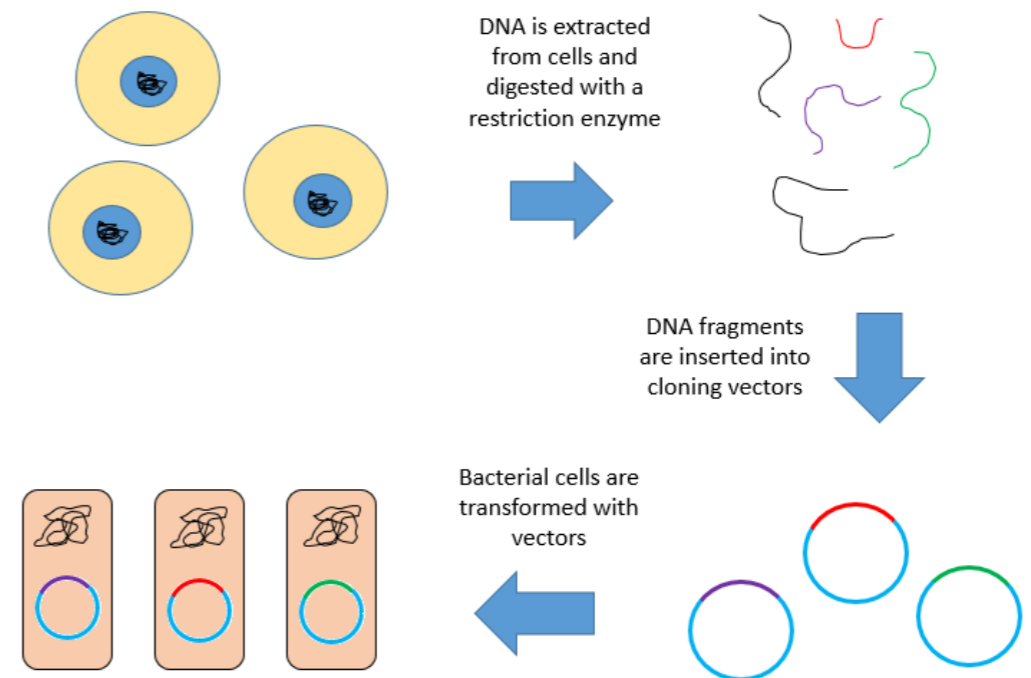


- Genomic libraries are a collection of an organism's entire genome (complete set of DNA).
- History:
  - In 1997, Frederick Sanger, the first scientist to fully sequence DNA-based genome, created a library for bacteriophage to use in DNA sequencing.



► Steps to create a genomic library:

- Extract DNA from organism's cell
- Use restriction enzyme to cut DNA into correctly sized fragments
- Fragments are incorporated into vectors (recombinant DNA) using the enzyme DNA ligase
- Vectors are put into another organism (usually *E. coli* or yeast) for amplification and duplication (TRANSFORMATION)



➤ Current Uses:

- Allows researchers to "[identify] the locations of specific genes", which is useful when trying to find mutations related to diseases and conditions.
  - Used in treatment of...
    - Parkinson's Disease
    - Alzheimer's Disease
    - Multiple Sclerosis
    - Rheumatoid Arthritis
    - Type One Diabetes
- Additionally, having the complete genome of an organism, will provide researchers with a better understanding of the organism as a whole.
- Genomic Libraries can as be used to "[clone] segments of DNA" by replicating vectors in the bacteria.
  - These copies can be "further studied or inserted into other vectors for genetic modification", such as crops.

## ➤ Pros

- Genomic libraries contain DNA fragments that represent the entire genome of an organism.
- Genomic libraries are larger compared to cDNA libraries.
- Genomic libraries represents the whole genome of an organism with both coding and non coding regions.
- Vectors used in genomic library include plasmid, lambda phage, BAC (Bacteria Artificial chromosome), which allow for cloning of different size DNA fragments.
- Don't have to repeat the process of cutting out genes, instead they are already stored.

➤ Cons

- Possibility of contamination from researchers that create the genomic libraries.

➤ Bioethical

- The collection of genes are there, open for use. If it gets in the wrong hands it could be a problem.
- Should we be using this to eradicate disease?

## ➤ Case Study

- The vector can be injected directly into a specific tissue in the body and is taken up by individual cells. Using another method, a sample of the patient's cells can be removed and exposed to the vector in a lab. The cells containing the vector are given back to the patient. If the treatment is successful, the new gene delivered by the vector will make a functioning protein. The gene sequences are found in the genomic libraries. More specifically, blood disease, cancer, hemophilia are a few diseases that can be effected by the process of using genomic libraries for gene therapy.



## ► Works Cited

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- <https://www.thermofisher.com/us/en/home/life-science/cloning/cloning-applications/library-construction.html>
- <https://www.ohio.edu/plantbio/staff/showalte/MCB%20720/MCB7200%20Lecture%203.ppt>
- <https://ghr.nlm.nih.gov/handbook/therapy/procedures>