

## Pangenome Reference Map

### Why in news?

A pangenome reference map has been built using genomes from 47 anonymous individuals (does not include Indians).

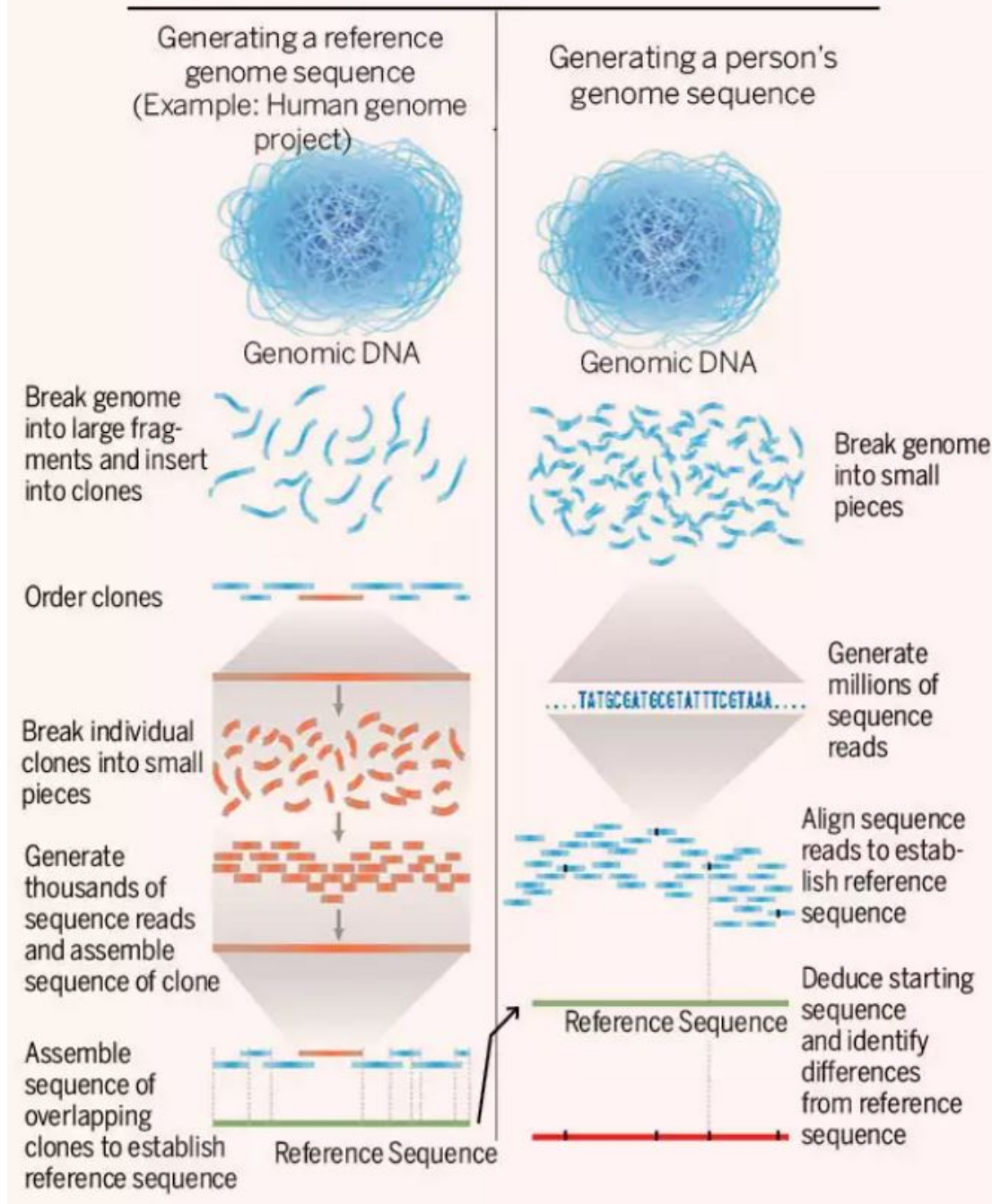
### What is genome?

- The genome is the *entire set of DNA instructions* found in a cell.
- It contains all the information needed for an individual to develop and function.
- In humans, the genome consists of 23 pairs of chromosomes located in the cell's nucleus, as well as in the mitochondria.
- Each chromosome is a contiguous stretch of DNA string which in turn is composed of millions of individual building blocks called ***nucleotides or bases***.
- The four bases include adenine, thymine, guanine and cytosine (A, T, G and C).
- The genome is an identity card like Aadhaar as each our genome is unique.
- To date, humans are the only life form that has successfully sequenced its own genome, yet there are many life forms that have substantially larger genomes.

### What is genome sequencing?

- ***Genome sequencing*** is the method used to determine the precise order of the four bases (A, T, G and C) and how they are arranged in chromosomes.
- It helps us understand human diversity at the genetic level and how prone we are to certain diseases.

# Human Genome Sequencing



## What is a reference genome and a pangenome reference map?

Feature	Reference Genome	Pangenome Map
<b>Definition</b>	A complete sequence of DNA for a particular species that acts as a reference map for newly sequenced genomes.	A collection of genomic sequences found in the entire species rather than a single individual.
<b>Purpose</b>	Used as a standard for comparing other genomes.	Used to study genetic diversity and identify genes associated with diseases.
<b>Accuracy</b>	Typically more accurate than pangenome maps.	More comprehensive than reference genomes.

<b>Diversity</b>	Typically based on the genomes of a small number of individuals.	Typically based on the genomes of a large number of individuals.
<b>Applications</b>	Gene mapping, genome sequencing, and drug discovery.	Disease research, personalized medicine, and evolutionary biology.

### What is the importance of pangenome reference map?

- **Human genetic diversity** - A complete and error-free human pangenome map will help to understand the differences and explain human diversity better.
- **Genetic variation** - It will also help us understand genetic variants in some populations.
- **Health** - It will allow scientists to identify the genes and gene variants that are associated with specific diseases.
- **Personalized medicine** - Information in the map can be used to develop personalized medicine approaches that are tailored to the individual patient's genetic makeup.
- **New insights into human evolution** - Can be used to study how genetic variation has changed over time and the history of our species.

### Quick facts

- **Human Genome Project**- The HGP was the international, collaborative research program for complete mapping and understanding of all the genes of human beings.
- It began in 1990 and was completed in 2003.
- **Genome India Project** - It was initiated and funded by the Department of Biotechnology (DBT) in 2020 for 3 years.
- It aims to build a grid of the Indian “reference genome”, to understand fully the type and nature of diseases and traits that comprise the diverse Indian population.
- This is spearheaded by the Centre for Brain Research at Bengaluru-based Indian Institute of Science as the nodal point of about 20 institutions.
- **The Human Pangenome Reference Consortium (HPRC)** - It is a project funded by the National Human Genome Research Institute, Maryland, United States.
- It aims to sequence and assemble genomes from individuals from diverse populations in order to better represent genomic landscape of diverse human populations.

### References

1. [The Hindu | Pangenome Reference Map](#)
2. [Humanpangenome | Human Pangenome Reference Consortium](#)