



Genome Sequencing in India

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CSIR (Council of Scientific and Industrial Research) plans to undertake genome sequencing of a sample of **nearly 1000 Indian rural youth** to determine **unique genetic traits, susceptibility (and resilience) to disease**.

- This is the **first time that** such a large sample of Indians will be recruited for a detailed study.
- These recruited youths, as part of **genome-sample collections**, are representative of the country's population diversity.
 - In this case, the bulk of them will be college students, both men and women, and pursuing degrees in the life sciences or biology.
- The project is an **adjunct to a much larger government-led programme**, still in the works, to sequence at **least 10,000 Indian genomes**.

Genome Sequencing

- Genome sequencing is figuring out the **order of DNA nucleotides, or bases, in a genome**—the order of Adenine, Cytosine, Guanine, and Thymine that make up an organism's DNA.
- **Human genome**
 - It is made up of **23 chromosome pairs** with a total of about 3 billion DNA base pairs.
 - There are **24 distinct human chromosomes: 22 autosomal chromosomes, plus the sex-determining X and Y chromosomes**.
 - Chromosomes 1-22 are numbered roughly in order of decreasing size.
 - Somatic cells usually have one copy of chromosomes 1-22 from each parent, plus an X chromosome from the mother and either an X or Y chromosome from the father, for a total of 46.
 - There are estimated 20,000-25,000 human protein-coding genes.
 - The estimate of the number of human genes has been repeatedly revised down from initial predictions of 100,000 or more as genome sequence quality and

gene finding methods have improved, and could continue to drop further.

Importance of Genome Sequencing

- Sequencing the genome is an important step towards understanding it.
- The genome sequence will represent a **valuable shortcut, helping scientists find genes much more easily and quickly**. A genome sequence does contain some clues about where genes are, even though scientists are just learning to interpret these clues.
- Scientists also hope that being able to study the entire genome sequence will help them understand how the genome as a whole works—how genes work together to direct the growth, development and maintenance of an entire organism.
- Finally, genes account for less than 25 percent of the DNA in the genome, and so knowing the entire genome sequence will help scientists study the parts of the genome outside the genes. This includes the regulatory regions that control how genes are turned on and off, as well as **long stretches of "nonsense" or "junk" DNA —so called because significance of it hasn't been established**.

Human Genome Project

- The Human Genome Project was an international research effort to determine the sequence of the human genome and identify the genes that it contains. The Project was coordinated by the **National Institutes of Health and the U.S. Department of Energy**.
- It was a **13-year-long, publicly funded project initiated in 1990** with the objective of determining the DNA sequence of the entire euchromatic human genome within 15 years.
- The overwhelming success of the Human Genome Project is readily apparent. Not only did the completion of this project usher in a new era in medicine, but it also led to significant advances in the types of technology used to sequence DNA.
- Today, the goal of **personalized medicine is to utilize information** about a person's genes, including his or her nucleotide sequence, to make drugs better and safer.
For example, evolution of **Her2/neu and Response to Breast Cancer Treatment and CYP450** and Response to Antidepressants are direct result of Human Genome Project.