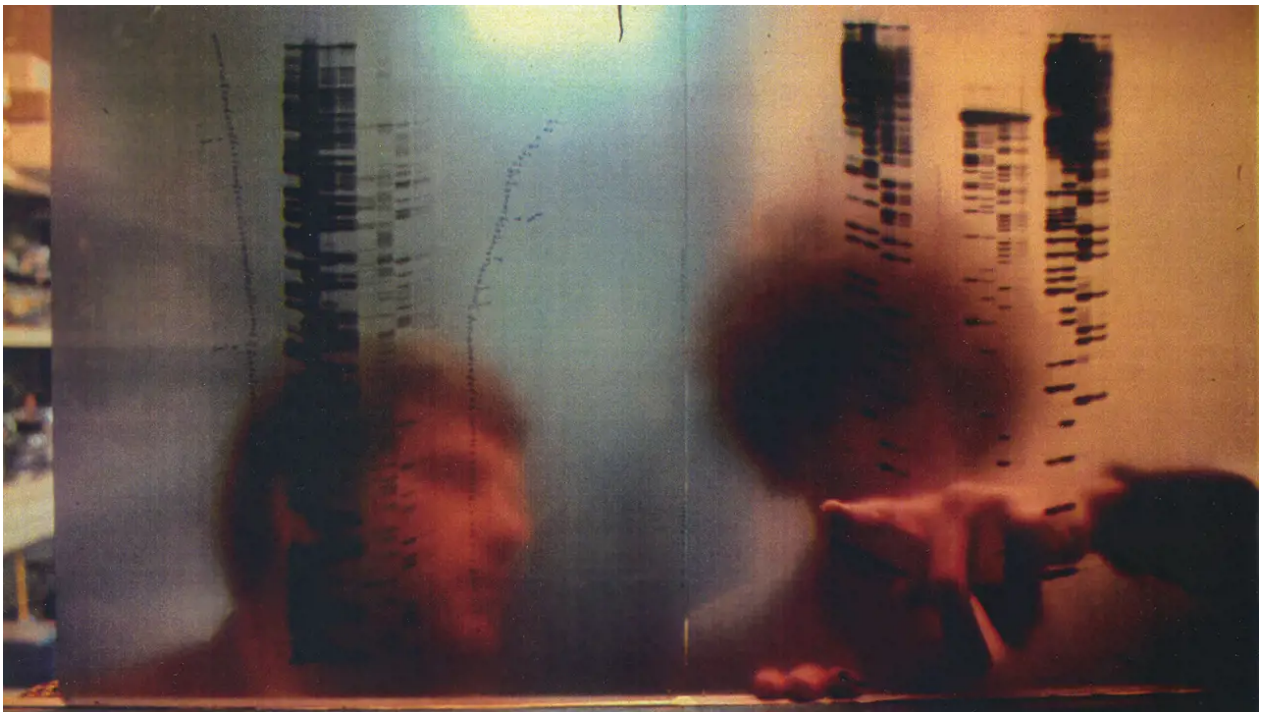
The Human Genome Project: Big Science [B1]

Questa iniziativa di collaborazione scientifica internazionale venne portata a termine vent'anni fa: un progetto senza precedenti nell'ambito della ricerca medica, con un metodo innovativo e multidisciplinare che aprì un universo di possibilità per combattere le malattie genetiche.



Deoxyribonucleic acid, or **DNA**, is the hereditary material in humans and almost all other organisms. It was first **isolated** in 1869. However, it took over a century of development before the field of genomics — the study of genes and their functions — was to transform science and medicine.

ORIGINS

In 1984, Italian-American virologist Renato Dulbecco suggested that given the advancements in genomics, knowing and ordering (or 'sequencing') the human genome — a human being's complete set of **DNA** — would help understand cancer, the most common human genetic disease. Dulbecco, who won the Nobel Prize for Medicine in 1975, was more ambitious than many biologists; they **argued** that **channelling** resources to one big science project was risky and **unfair** to small research units, the usual way of doing

science **up until then**. In 1988, however, the US National Academy of Science committee report **endorsed** the project, and **funding** to start a three-billion-dollar, fifteen-year programme was received.

PROCESS

The Human Genome Project officially began in October 1990. It was the largest international collaboration ever **undertaken** in biology. Thousands of scientists working in multiple centres across the US, China, Japan, France, Germany and the UK **teamed up**. It was decided to sequence the smaller genomes first, such as mouse, **worm** and fruit fly (all with significant gene similarities to human), before **taking on** the **challenging** human genome. On 14 April 2003, the Human Genome Project was declared completed.

RESULTS

Dulbecco died in 2012, but he lived to see his idea transform cancer research, as well as that of other genetic illnesses: from cystic fibrosis, resulting from mutations in a single gene, to Alzheimer's, where many genes are **involved**. It helped doctors identify hereditary mutations and led to the development of new technologies and tools for testing and analysis. **What's more** the Human Genome Project marked a whole new **approach** to science that was to be crucial in combatting the Covid pandemic. Combining the expertise of biologists, engineers, computer scientists and mathematicians, it established an open **approach** to data sharing and **open-source software**, making the project's **findings** accessible to everyone.

THE FUTURE

New initiatives have been set up to **fine-tune** the sequencing process, and significant advancements have been made in **targeted** and personalised treatments. In 2020, the Nobel Prize for Chemistry was **awarded** to Jennifer Doudna and Emmanuelle Charpentier for their work in genome editing. They developed a technique known as CRISPR/Cas9 that can repair errors in the

DNA itself. This type of research was made possible by the Human Genome Project. www.genome.gov

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Glossary

- **DNA** = acido desossiribonucleico
- **teamed up** = formare una squadra
- **challenging** = impegnativo
- **What's more** = inoltre
- **undertaken** = intraprendere
- **taking on** = affrontare
- **findings** = scoperte
- **fine-tune** = affinare
- **isolated** = isolare
- **unfair** = ingiusto
- **up until then** = fino a quel momento
- **endorsed** = appoggiare, sostenere
- **worm** = verme
- **open-source software** = software con codice aperto
- **targeted** = mirare
- **awarded** = assegnare
- **argued** = sostenere
- **channelling** = destinare
- **funding** = finanziamento
- **involved** = coinvolgere
- **approach** = approccio