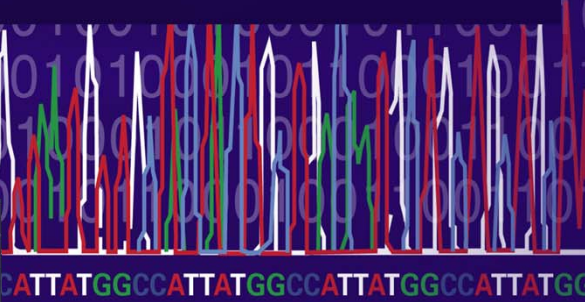
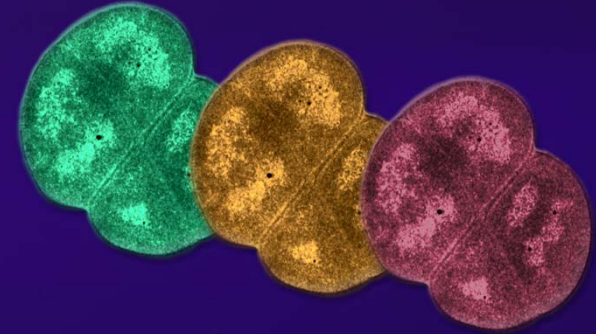
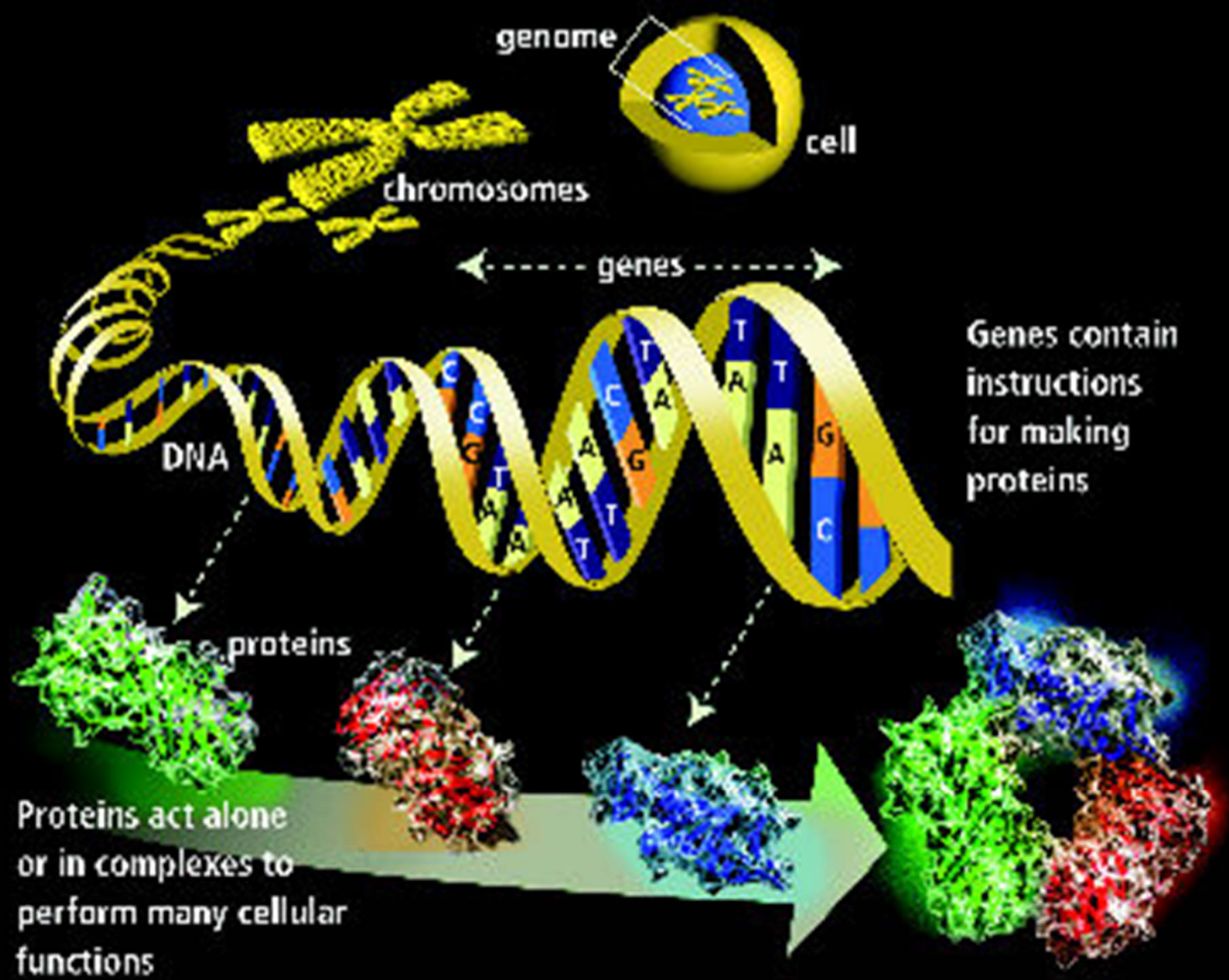


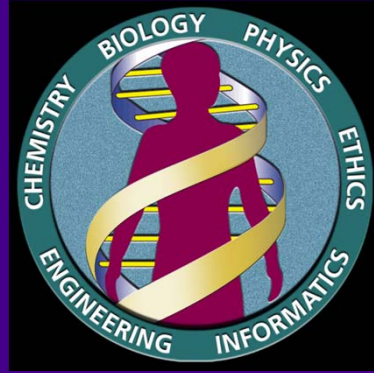
# Beyond the Human Genome Project

## New Discovery Paths and Diverse Applications





U.S. DEPARTMENT OF ENERGY



In 2003 scientists in the Human Genome Project obtained the DNA sequence of the 3 billion base pairs making up the human genome

# What we've learned so far from the Human Genome Project



The human genome is nearly the same (99.9%) in all people



Only about 2% of the human genome contains genes, which are the instructions for making proteins

# Other Lessons from the Human Genome Project



Humans have an estimated 30,000 genes; the functions of more than half of them are unknown



Almost half of all human proteins share similarities with other organisms, underscoring the unity of life

Much is still unknown!



# Explore how DNA impacts HEALTH



Identify and understand the differences in DNA sequence (A, T, C, G) among human populations



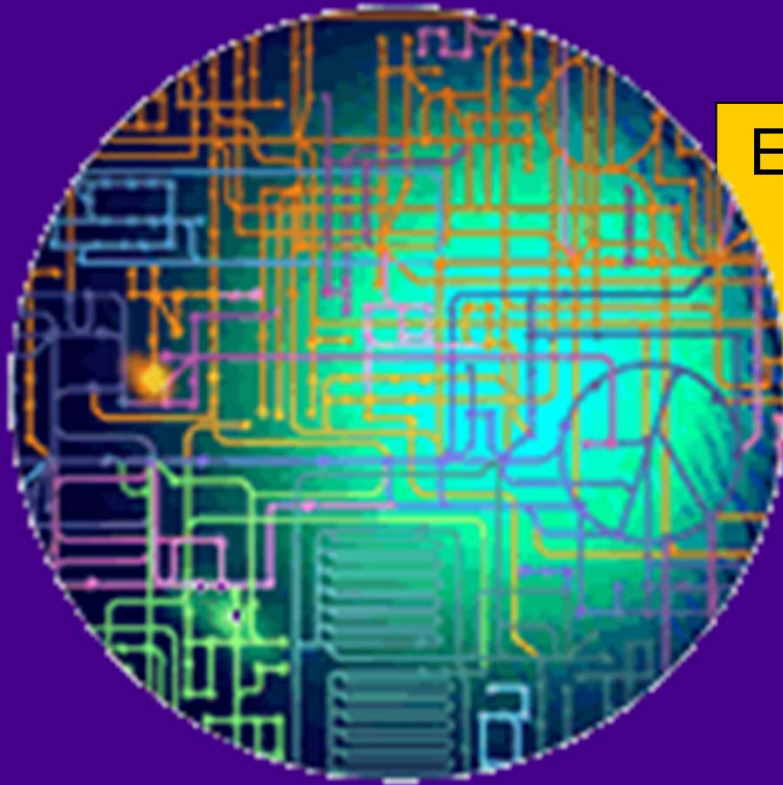
# Understand what all the **GENES** do

Discover the functions of human genes by experimentation and by finding genes with similar functions in the mouse, yeast, fruit fly, and other sequenced organisms





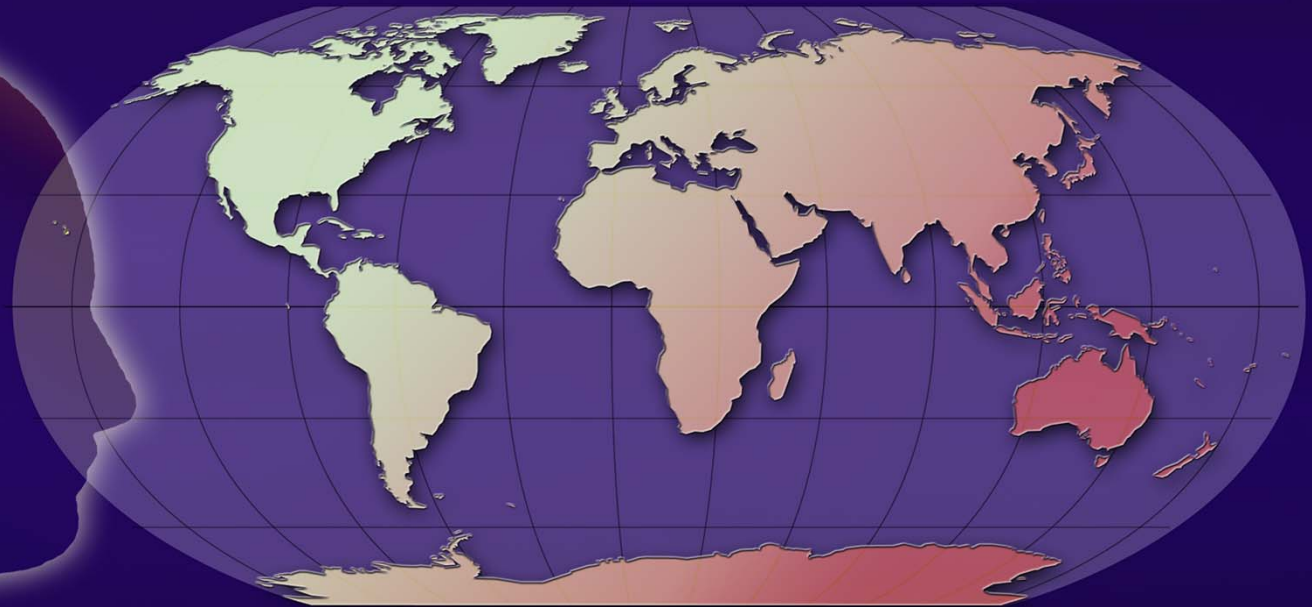
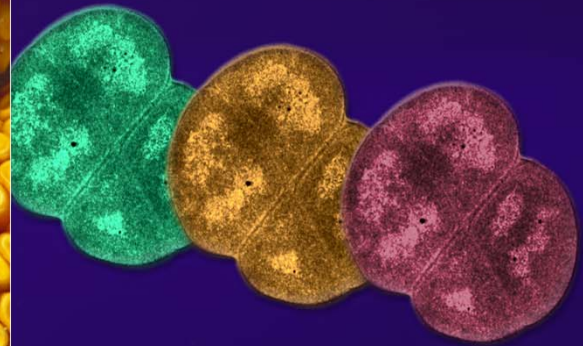
# Understand how the genome enables life



Explore life at the ultimate level of the whole organism instead of single genes or proteins.

The DOE Genomes to Life program provides a foundation for this understanding by using the information found in the genomes of microbes, life's simplest organisms, to study how proteins—the products of genes—carry out all activities of living cells.

# Diverse Applications of DNA Data and Technologies



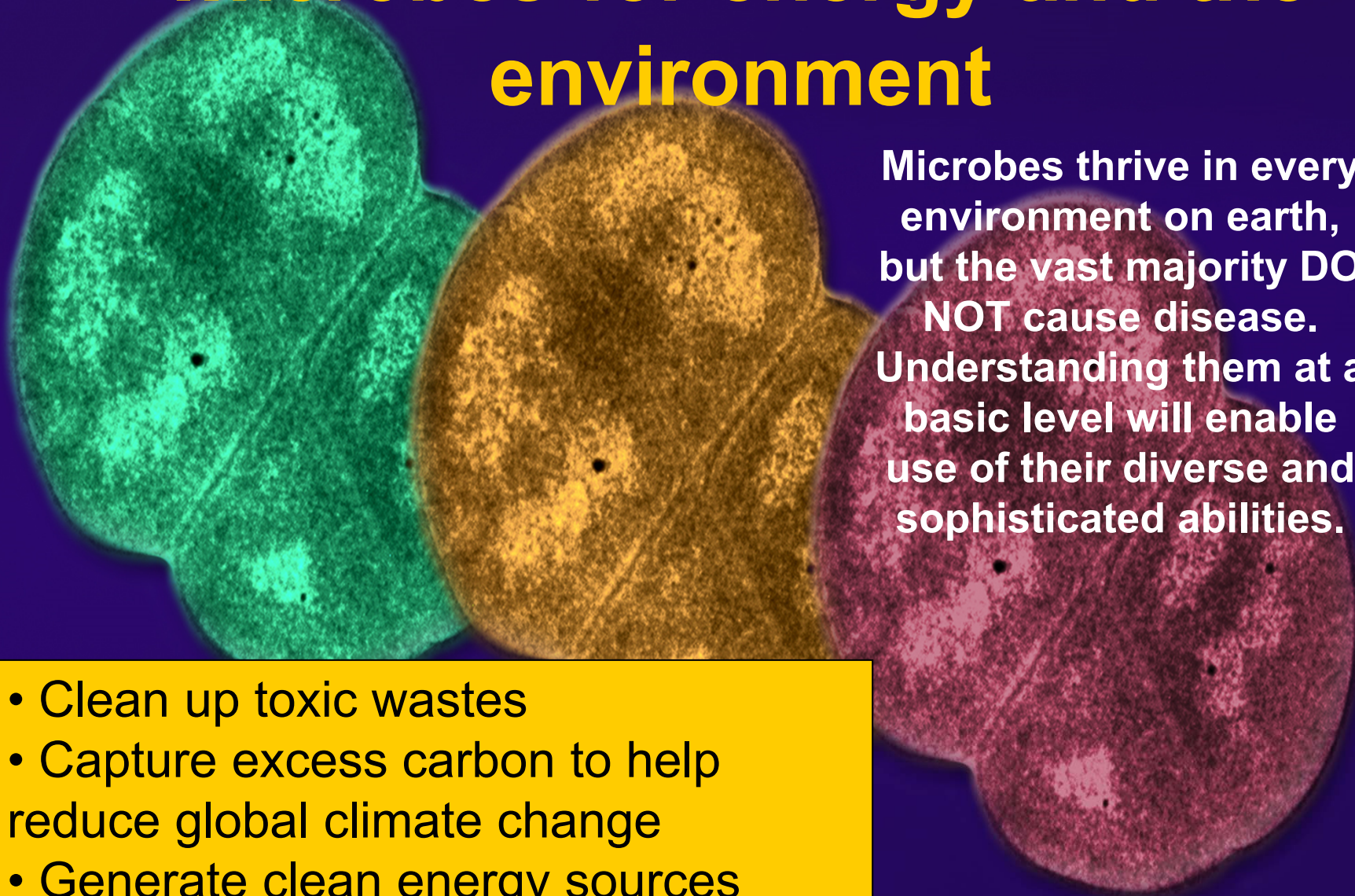
Medicine Energy Environment Agriculture Identification Bioanthropology

# Medicine



- Develop more accurate and rapid diagnostics
- Design customized treatments

# Microbes for energy and the environment



Microbes thrive in every environment on earth, but the vast majority DO NOT cause disease. Understanding them at a basic level will enable use of their diverse and sophisticated abilities.

- Clean up toxic wastes
- Capture excess carbon to help reduce global climate change
- Generate clean energy sources (e.g., hydrogen)

# Bioanthropology

- Understand human lineage
- Explore migration patterns through time



# Agriculture, livestock breeding, bioprocessing

- Make crops and animals more resistant to diseases, pests, and environmental conditions
- Grow more nutritious and abundant produce
- Incorporate vaccines into food products
- Develop more efficient industrial processes



# DNA identification

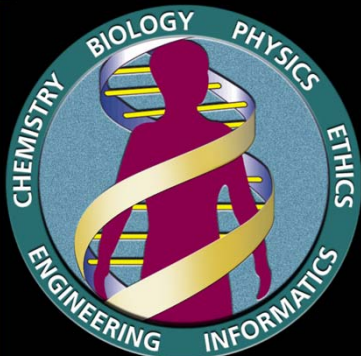


- Identify kinships, catastrophe victims
- Exonerate or implicate people accused of crimes
- Identify contaminants in air, water, soil, food
- Confirm pedigrees of animals, plants, foods, wines

This presentation is a companion to the  
**BEYOND THE HUMAN GENOME  
PROJECT** poster produced by the U.S.  
Department of Energy Human Genome  
Program

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