ALLEGHENY COLLEGE

COMPUTER SCIENCE
Department

Introduction to Bioinformatics

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Bioinformatics is

a relatively new scientific discipline created from the interaction of biology and computer science.

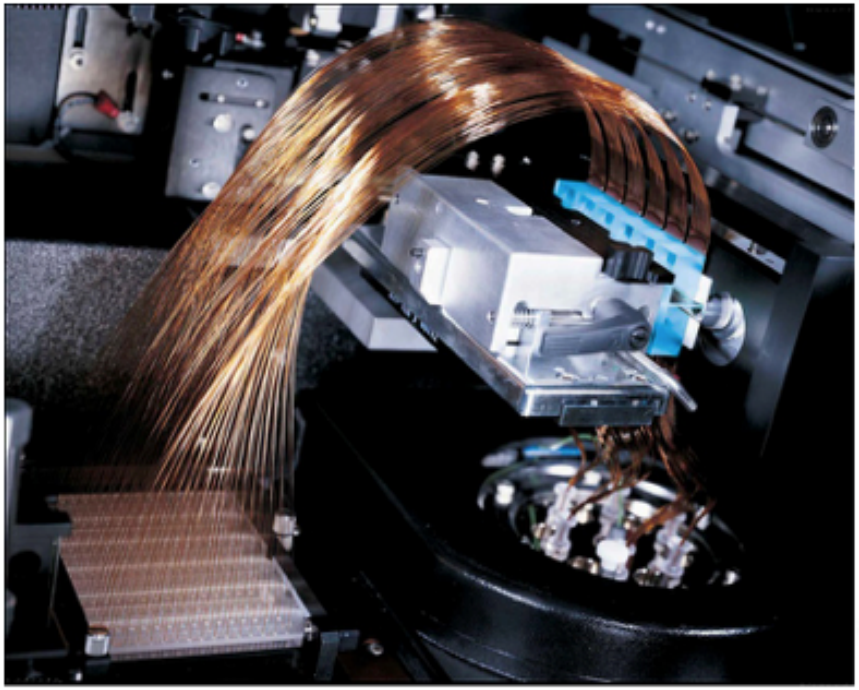
Birth of Bioinformatics

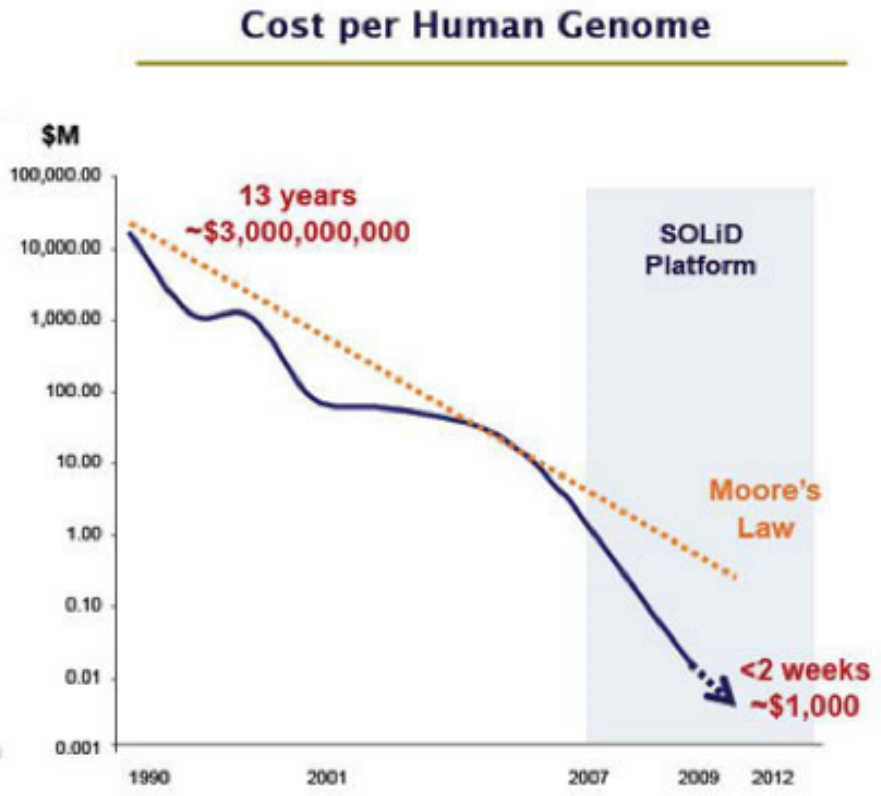
In 1960s and 70s Margaret Oakley Dayhoff created:

- the first protein database
- the first program for sequence assembly

Genomics era: High-throughput DNA sequencing

- Automated DNA sequencing
- Genomes of Mycoplasma and Haemophilus - 1995
- Drosophila genome - 1999
- Human Genome Project and Celera




Cost per Human Genome
$M
100,000.00
10,000.00
1,000.00
100.00
10.00
1.00
0.10
0.01
0.001
13 years
~$3,000,000,000
SOLiD
Platform
Moore's
Law
<2 weeks
~$1,000
1990
2001
2007
2009
2012

21st century is a century of biotechnology

- Genomics
- Microarray
- Proteomics
- Metabolomics

How to handle the large amount of information?

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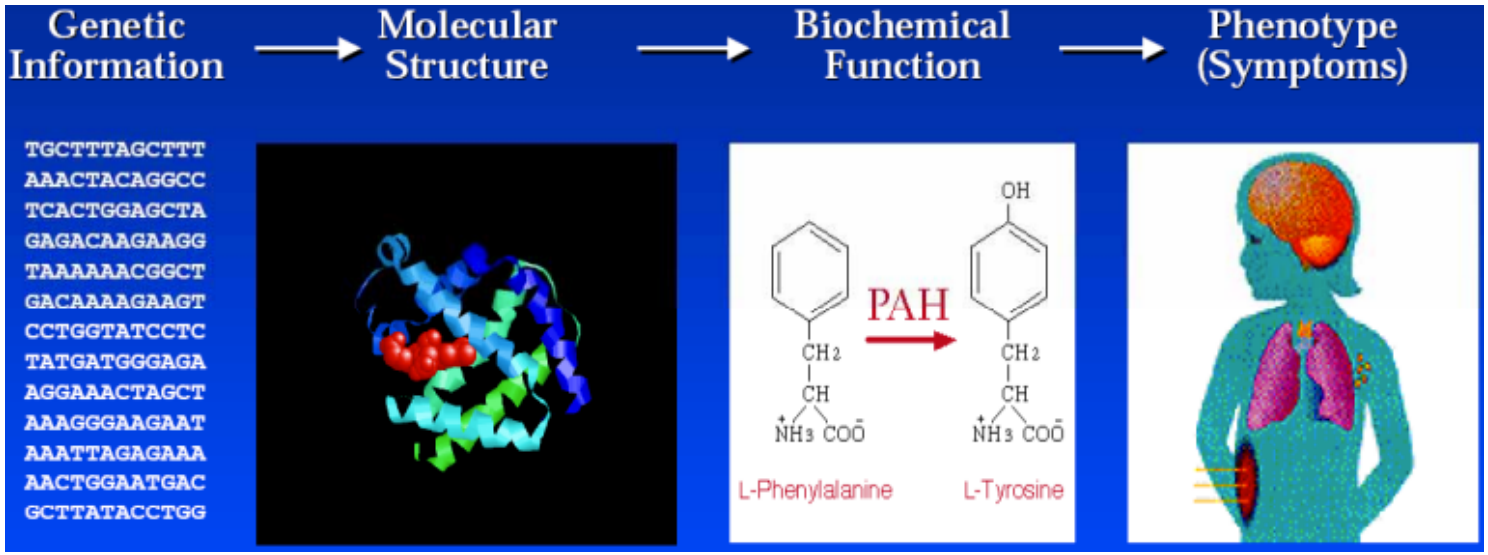
Answer: **Bioinformatics**

"Biology easily has 500 years of exciting problems to work on."
Donald Knuth



Why is it interesting?

- Important problems.
- Massive quantities of data.
- Desperate need for efficient solutions.
- Success is rewarded.

Market Trends

- Current bioinformatics market is worth over $4 billion
- Prediction: $13.3 billion by 2020
- Increasing number of Bioinformatics companies : Genomatrix Software, Genaissance Pharmaceuticals, Lynx, Lexicon Genetics, DeCode Genetics, CuraGen, AlphaGene, Bionavigation, Pangene, InforMax, TimeLogic, GeneCodes, LabOnWeb.com, Darwin, Celera, Incyte, BioResearch Online, BioTools, Oxford Molecular, Genomica, NetGenics, Rosetta, Lion BioScience, DoubleTwist, eBioinformatics, Prospect Genomics, Neomorphic, Molecular Mining, GeneLogic, GeneFormatics, Molecular Simulations, Bioinformatics Solutions...

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- Exponential growth of investments.
- Constant deficit of trained professionals.
- Diversification of bioinformatics applications.

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- Stretch your creativity and problem-solving skills to the limit.
- Join a cross-disciplinary team - work with interesting people.
- Participate in unlocking the mysteries of life itself.
- Make the world a better place.