Very short primer on cell biology

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The cell

http://micro.magnet.fsu.edu/cells/index.html
The nucleus & chromosomes

Chromosomes are DNA strings
DNA

4 different bases: A, C, G, T
Double stranded, complimentary
Pairs together as: A-T and C-G
The Central Dogma

DNA *transcribed* into mRNA

mRNA *translated* into protein

proteins are the active units, eg. cell building blocks, enzymes, ...

Information never goes the other way (except for some virus)
A gene

Gene: Stretch of DNA that gets transcribed into mRNA
Human vs. bacteria

Phylogenetic Tree of Life

Bacteria
- Spirochetes
- Proteobacteria
- Cyanobacteria
- Rhodobacter
- Aquifex

Archaea
- Methanosarcina
- Methanobacterium
- Methanococcoides
- Thermoproteus
- Pyrodictium

Eucaryota
- Entamoebae
- Slime molds
- Animals
- Fungi
- Plants
- Ciliates
- Flagellates
- Trichomonads
- Microsporidia
- Diplomonads
Human vs. bacteria

Phylogenetic Tree of Life

Prokaryotes
Human vs. bacteria

Phylogenetic Tree of Life

- **Bacteria**
  - Proteobacteria
  - Cyanobacteria
  - Rickettsiales
  - Bacteroides
  - Aquifex

- ** Archaea**
  - Methanococcaceae
  - Methanomicrobiales
  - Thermoproteus
  - Pyrococcus
  - Halobacteriales

- **Eucaryota**
  - Entamoeba
  - Slime molds
  - Animals
  - Slime molds
  - Plants
  - Ciliates
  - Flagellates
  - Trichomonads
  - Microsporidia
  - Diplomonads

Prokaryotes  Eukaryotes
Prokaryotes vs. Eukaryotes

Prokaryotes: Single cells, no nucleus DNA spread out in the cell

Eukaryotes: Multi-cellular, DNA inside nucleus
Sequencing

- Genome: All DNA on chromosomes inside the cell

- Sequencing is trying to read the bases of the genome
Polymerase Chain Reaction

- DNA is often found in very low amounts (e.g. 1 ug)
- More is often needed for sequencing
- DNA can be amplified using Polymerase Chain Reaction

- Use DNA polymerase (enzyme) and primers (small pieces of DNA that bind to region of interest)

http://www.youtube.com/watch?v=HMC7c2T8fVk&feature=related