Goals of Genomics (chap 9)

• Assemble physical and genetics maps
  ➢ Physical maps: location, in base pairs, and distances between genes
  ➢ Genetic maps: relative arrangement and approximate distance of genes on chromosomes (recombination mapping)

• Gather info. about expressed and unexpressed gene regions

• SEE PAGE 216 IN TEXTBOOK- MAP OF CHROMOSOME 19
Goals (cont’d)

- Profiles of expressed genes under various conditions
- Mapping all the genes
- Gene function and regulation (functional genomics)
- Identification of all proteins and their functions
Goals (cont’d)

- Characterization of DNA polymorphisms
  - Pharmacogenomics – why people respond differently to medicines
- Comparing genomes of different species (comparative genomics)
- Fine tuning genome database and research tools
  - Bioinformatics – a discipline which combines biology, computer science and information technology
Other “Omes”

- (Human genome project- covered in other power point)
- Proteome – all the proteins found in a cell, and how they work- the study of proteins encoded by the genome
- Transcriptome – genes expressed
- Metabolome – entire metabolic state of a cell
DNA Profiling and Forensics (chap. 11)

DNA can now be used for:

- Criminal and civil cases
- Finding missing persons
- Establishing paternity
- Medical diagnostics
- Establishing evolutionary relationships
- Explaining genetic diversity
DNA evidence

- Human DNA 99% to 99.9% identical from person to person
- Use the 1% to 0.1% that is different in DNA identification methods
- This small percentage leads to a unique DNA fingerprint; also called DNA typing or profiling
Satellite DNA

- Types of repetitive DNA with unclear function – much of the 3 billion b.p. of the genome

- 2 major classes:
  - Tandemly repetitive sequences, about 10% of genome
  - Interspersed repetitive DNA, 5-20% of genome, these subdivided as SINES (< 500bp) or LINES (= 500bp)
VNTRs

- Variable number tandem repeats – short DNA sequences repeated in tandem (adjacent to one another).
- Variation related to number of times the short sequence is repeated in a given locus- variability specific in each person, based on inheritance from parents, so VNTRs used in fingerprinting.
Types of Satellites

- **Minisatellites**
  - Short tandem repeats, 2-5 bp, overall length 70-200 b.p., most variable in copy number among people

- **Microsatellites**
  - Near telomeres, 20 b.p core sequence, 1-390 kb in length

- **Macrosatellites**
  - Near centromeres and telomeres, magabases long
Forensic Example
Satellite DNA comparison

http://www.people.virginia.edu/~rjh9u/forenscr.html
Technical Issues with DNA Evidence

- Preserve the integrity of the DNA – make sure sample is properly collected
- Restriction enzyme digestion complete – also, make sure DNA is not degraded
- Standardize hybridization methods
- Select appropriate probes – so evidence can be properly interpreted

SEE PAGES 271-271 OF TEXTBOOK
What about Privacy?

- [http://www.alternet.org/rights/19234/](http://www.alternet.org/rights/19234/)