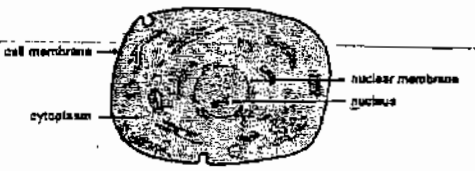
ANTH 215

BIOLOGICAL BASIS OF LIFE

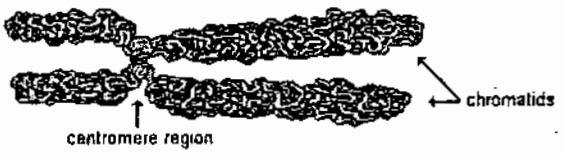
genetics
Gregor Mendel
cell functions:

1. taking in nutrients
2. combining the nutrients into substances for cell growth and repair
3. reproducing themselves
4. excreting waste matter

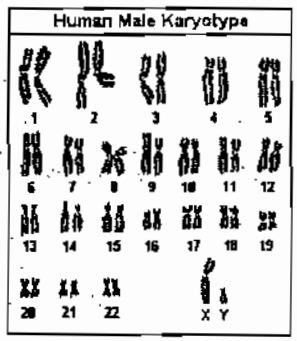
prokaryotic cells
eukaryotic cells
cell membrane
nucleus (nuclear membrane)
cytoplasm
organelles (e.g. ribosomes, mitochondria, endoplasmic reticulum, centrioles, etc.)



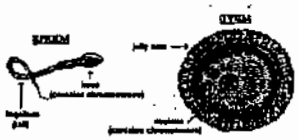
Doubled human chromosome
normal humans: 46
arms or chromatids
centromere
karyotype
Down syndrome

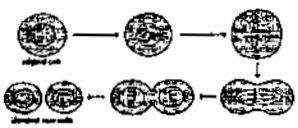


22 pairs of autosomes
one pair of sex chromosomes
X and Y
SRY (sex-determining region Y) gene
homologous pairs
X and Y chromosomes of males are hemizygous ,
"Barr bodies"
somatic cells and sex cells
males: sperm (testes)
females: ova or eggs (ovaries)



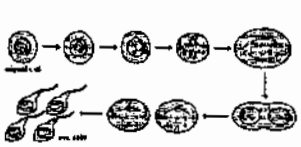
Reproduction:
Gametogenesis, sex cells (gametes), cells that contain ½ the normal chromosomal content (haploid condition)
Fertilization restores diploid condition
spermatogenesis
oogenesis



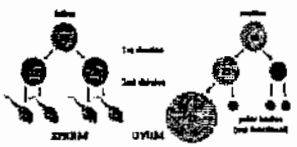


Mitosis

Mitosis
zygote
Meiosis (production of sex cells or gametes): 2 divisions/reduction



Meiosis



gametogenesis

gene: basic unit of inheritance
DNA = deoxyribonucleic
RNA = ribonucleic acid
functions:

1. transmission of genetic information from one generation to the next
2. maintains genetic integrity of individual through duplication/replication
3. instructs cells to make proteins (enzymes).

nucleotides

1. sugar molecule (a 5-carbon or pentose) ribose (RNA) or deoxyribose (DNA)
2. phosphoric acid
3. nucleotide base

4 kinds of bases in the DNA molecule:

adenine (A) } purines
guanine (G) }
thymine (T) } pyrimidines
cytosine (C) }

RNA: uracil (U) in place of thymine
DNA: double helix

Protein Synthesis
20 amino acids
3-letter words: triplets or codons

RNA and proteins
mRNA (messenger RNA)
transcription
ribosomal RNA (rRNA)
transfer RNA e.g., UUU= phenylalanine, CAA= glutamine etc.)
Gene

E.g., The sickle cell hemoglobin molecule:2 α (alpha) and 2 β (beta) polypeptide chains-6th a.a.in e β chain instead of glutamic acid (found in normal hemoglobin), valine is substituted in the HbS molecule; the genetic word, CTT (HbA) to CAT (

Types of Gene Mutation

1. substitution of a base pair (as in above example)
2. deletion or insertion of genetic material which can drastically alter the structure and function of the a.a. chain.

Causes of Mutation:

higher temperatures, high energy radiation (x-rays, ultraviolet radiation), mustard gas, caffeine etc.

Definition of Gene

" gene is that section of the DNA molecule (sequence of codons on the DNA template) responsible for the ultimate synthesis of a specific polypeptide chain of a.a."

" gene is that portion of the DNA molecule that specifies the manufacture of a protein that will produce or assist in the production of one or more physical traits. Not a discrete unit but part of a large DNA molecule."