DNA

- What is DNA?
    - What is its shape? Why is the shape important?
- Where is it found?
- What does it do?

DNA

- What bases make up DNA?
- How do they pair?
- What does the sequence of bases do?

Proteins

- What is a protein?
- What are amino acids?
- How do they make proteins?
- How does DNA make proteins?

Protein Synthesis

- What are transcription and translation?
- How does RNA differ from DNA
- What is the difference between mRNA and tRNA?
- How does the ribosome help?
- How is the protein made?

This is how a protein is created --
But this is only the start

We don't just have one copy of a
gene, we have two, and we have to
know

- How do these two copies
  combine to create a phenotype?
- How do we get our two copies?
- How is variation produced?

3 Part question

- How does the genetic code create a
  characteristic?

- How come we resemble our parents? That
  is, how is our heritable information passed
  from generation to generation?

- Where does variation in the code come
  from?

Example: Sickle Cell

Example: Blood Type

- ABO

- A creates an antigen on the blood, which
  will result in antibodies against B

- B creates an antigen on the blood, which
  will create antibodies against A

- O creates no antigens - but will create
  antibodies against both

- AB creates both antigens, and therefore no
  antibodies

Example: Eye Color

- actually created by pigment genes at at least 3 locales
- Blue eyes are due to the lack of other pigmentation
- One allele makes nothing, others make pigmentation.
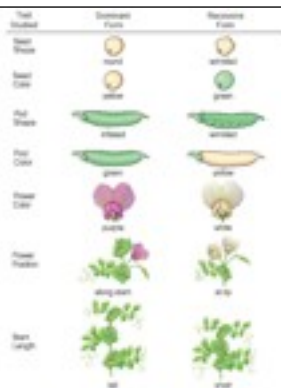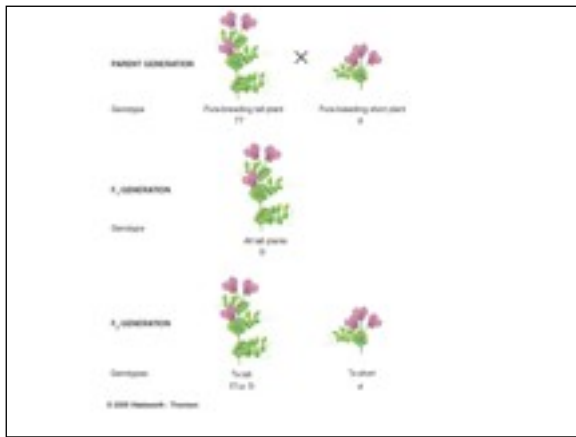
Mendel
1822-1884

Mendel

- Inferred mechanism of heredity from patterns
- Inferred GENES (or particles of inheritance) from phenotypic rations
- Gave the idea of DOMINANCE and RECESSIVENESS

BUT HOW?

Conclusions

- Traits can be hidden in an individual
    - The character that is hidden is called recessive
    - Character shown is called dominant
- Those tall plants of the F1 generation must be hiding the "short" - not the same as the tall of the parental generation.
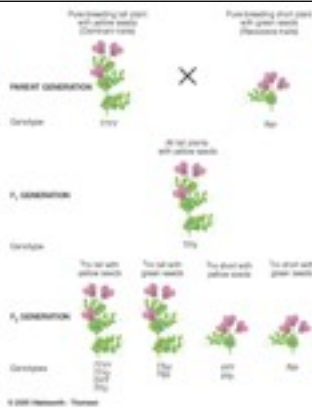
Law of Segregation

- Each person carries two particles of inheritance for each trait
- These separate (segregate) during reproduction, one copy being passed on to the next generation
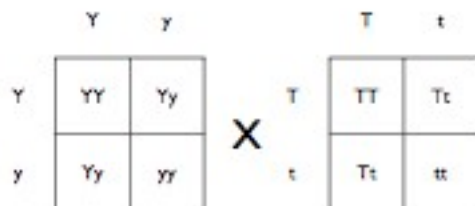
Punnett Square
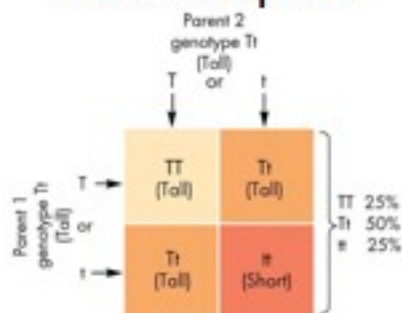
Multiple Traits?

Two Traits

	Y	y
Y	YY	Yy
y	Yy	yy

X

	T	t
T	TT	Tt
t	Tt	tt

2 trait punnett square

|	TY	Ty	tY	ty
TY	TTYY	TTYy	TtYY	TtYy
Ty	TTYy	TTyy	TtYy	Ttyy
tY	TtYY	TtYy	ttYY	ttYy
ty	TtYy	Ttyy	ttYy	ttyy

Phenotypes: 9 TY, 3 Ty, 3 tY, 1 ty

Law of Independent Assortment

- the units which govern one trait assort independently of the units that govern other traits

- true of chromosomes - mostly true on loci, due to crossing over

Human Mendelian Inheritance?

- most human traits more complicated than all that

- but a few are inherited this way

- Online Mendelian Inheritance in Man (OMIM)
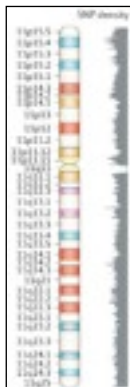
Example: Sickle Cell Anemia

- result of recessive allele at 11p15.5

Sickle cell

	HbA	HbS
HbA	AA	AS
HbS	AS	SS

HbA = Dominant, HbS = Recessive

Mendelian Traits

- Sickle cell (R)
- Cystic Fibrosis (R)
- Tay-Sachs disease (R)
- Phenylketonuria (R)
- Huntington disease (D)
- Achondroplasia (D)
- Hemophilia (R)

Mendelian Traits

- Hitchhiker's thumb (recessive)

- Earlobe attachment (recessive)

Other Simple Mendelian Traits

- Tongue rolling (dominant)

- Darwin's Tubercle (dominant)

Other Simple Mendelian Traits

- Mid-digital hair (dominant)

- Hand clasping (left over dominant)

Heritability - a 3 Part question

- How come we resemble our parents? That is, **how is our heritable information passed from generation to generation?**

- How does the genetic code create a characteristic?

- Where does variation in the code come from?

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