Class 4 8/30/17
Mendelian Genetics

- Announcements
- Class administration
- Check iLearn for suggested problems

- Office hours HH668C:
  - Mon 2 – 4pm
  - Will reschedule next week, check iLearn

i>clicker

or

- ❑ Did you bring your clicker remote today? GREAT!!
- ❑ Please check iLearn for your clicker score in gradebook (ignore any letter grades in gradebook)
- ❑ If your clicker score is missing, please e-mail me your clicker remote ID.

Biol 572/872 Ecology, Evolution, & Conservation Biology Colloquium

Tuesday, 9/5/17
HH 543, 2:10pm

http://biology.sfsu.edu/content/EEC

Justen Whittall
Santa Clara University
Intercontinental flower color enigma - evolution & ecology of the scarlet (& blue) pimpernel in California, Spain and Chile

https://www.scu.edu/cas/biology/faculty/whittall/

Romberg Tiburon Center Seminar Series

http://rtc.sfsu.edu/seminar/index.htm

Wednesday, 9/6/17
Bay Conference Center, 3:30PM

Cassia Pianca
Romberg Tiburon Center
Coastal Geomorphology Evolution from Hours to Decades: Lessons from Video Remote Sensing

https://www.researchgate.net/profile/Cassia_Pianca

Biol 871 Colloquium in Microbiology, Cell & Molecular Biology

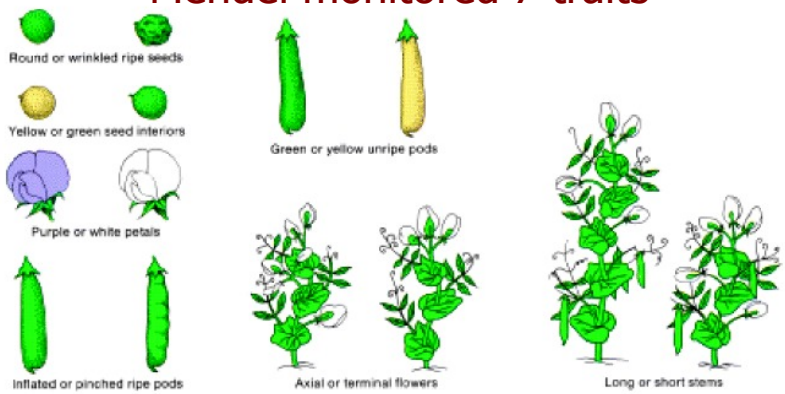
Thursdays, 9/7/17
SCI 210, 2:10 pm

http://biology.sfsu.edu/content/MCMB

Ben Blackman
UC Berkeley
Evolving timekeepers: the genetics of natural variation in diurnal and seasonal biological rhythms

https://nature.berkeley.edu/blackmanlab/Blackman_Lab/Welcome.html

Mendel monitored 7 traits



- Seven pairs of contrasting traits that were true-breeding
- Mendel
  - determined that discrete units of inheritance exist and
  - predicted their behavior during the formation of gametes

Figure 2-3

Inheritance of seven contrasting traits

Table 2-1 Results of All Mendel's Crosses in Which Parents Differed in One Character

Parental phenotype	F_1	F_2	F_2 ratio
1. Round×wrinkled seeds	All round	5474 round; 1850 wrinkled	2.96:1
2. Yellow×green seeds	All yellow	6022 yellow; 2001 green	3.01:1
3. Purple×white petals	All purple	705 purple; 224 white	3.15:1
4. Inflated×pinched pods	All inflated	882 inflated; 299 pinched	2.95:1
5. Green×yellow pods	All green	428 green; 152 yellow	2.82:1
6. Axial×terminal flowers	All axial	651 axial; 207 terminal	3.14:1
7. Long×short stems	All long	787 long; 277 short	2.84:1

- For each trait, which allele is dominant and which is recessive?
- Which phenotype was observed in the F1 progeny?
- What is the F2 phenotypic ratio?

Table 2-1

PRACTICE CLICKER QUESTION

- If the green pea pod allele (G) is dominant to the yellow allele (g), a cross between two heterozygous plants would be expected to produce _____.

A. all green
B. 1/4 green and 3/4 yellow
C. 1/2 green and 1/2 yellow
D. 3/4 green and 1/4 yellow
E. all yellow

The cross is expected to produce offspring in the genotypic proportions of 1/4 GG, 2/4 Gg, and 1/4 gg. Since G is dominant to g, 1/4 GG and 2/4 Gg = 3/4 green and 1/4 gg is yellow.

http://igrowveg.com/wp-content/uploads/2009/07/dwarfbeansh180709.jpg

Figure 3.1

Mendel proposed three postulates of inheritance

- Unit factors exist in pairs
  - Mendel proposed the existence of "particulate unit factors" (now called "genes") for each trait.
  - True-breeding plant has two copies of the unit factor
- Dominance/Recessiveness
  - In the pair of unit factors for a single characteristic in an individual, one unit factor is dominant and the other is recessive.
    - Dwarf characteristic reappeared in F2 generation
- Segregation of unit factors (Principle of Segregation)
  - The paired unit factors segregate (separate) independently during gamete formation.

Genetic terminology

Tall plant allele = D and dwarf plant allele = d

- The **genotype** is the genetic makeup of an individual
- The **phenotype** is the physical expression of the genetic makeup.
- When the alleles (alternative forms of a single gene) for a trait in an individual are the same, the individual is **homozygous**.
  - DD genotype exhibits the tall plant phenotype
  - dd genotype exhibits the dwarf plant phenotype
- If the alleles differ, the individual is **heterozygous**
  - Dd genotype exhibits the tall plant phenotype

Monohybrid cross with Punnett Square-1

- Each parent is true-breeding for trait
  - Dominant trait Tall is D
  - Recessive trait Dwarf is d
  - DD x dd = P1 cross
- Each parent generates haploid gametes
  - DD --> D
  - dd --> d
- The first filial generation hybrid cross (F1)
  - genotype Dd
  - phenotype is Tall
- Allow the F1 to self-fertilize
  - Gametes: D or d

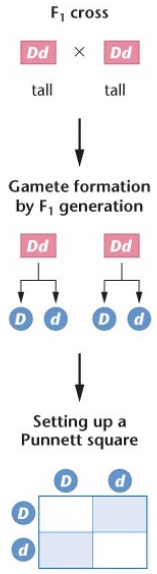


Figure 3.3

Monohybrid cross with Punnett Square-2

- Allow the F1 to self-fertilize
  - Gametes: D or d
- 4 possible gamete combinations for F2
- Genotype
  - 1DD:2Dd:1dd
- Phenotype
  - 3 tall:1 dwarf

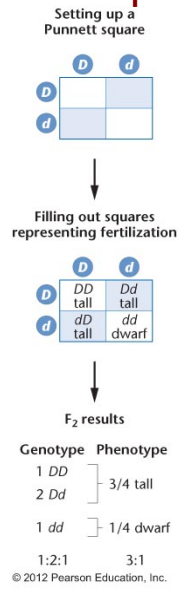


Figure 3.3

Practice Clicker Question

- You are walking in a meadow and find a **tall pea plant**…is it homozygous or heterozygous for the plant height trait?

A	B	C
DD	Dd	A or B
Homozygous tall	Heterozygous tall	

Figure 3.4