

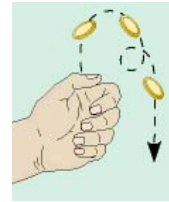
Chapter 14.

Probability & Genetics



Genetics & Probability

- **Mendel's laws:**
 - ◆ segregation
 - ◆ independent assortment
- reflect same laws of probability that apply to tossing coins or rolling dice**

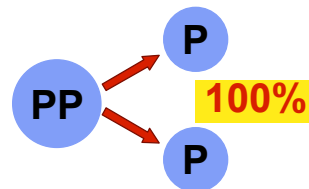
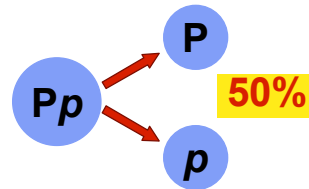


Probability & genetics

- Calculating probability of making a specific gamete is just like calculating the probability in flipping a coin

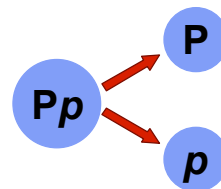
- ♦ probability of tossing heads? **50%**

- ♦ probability making a P gamete...

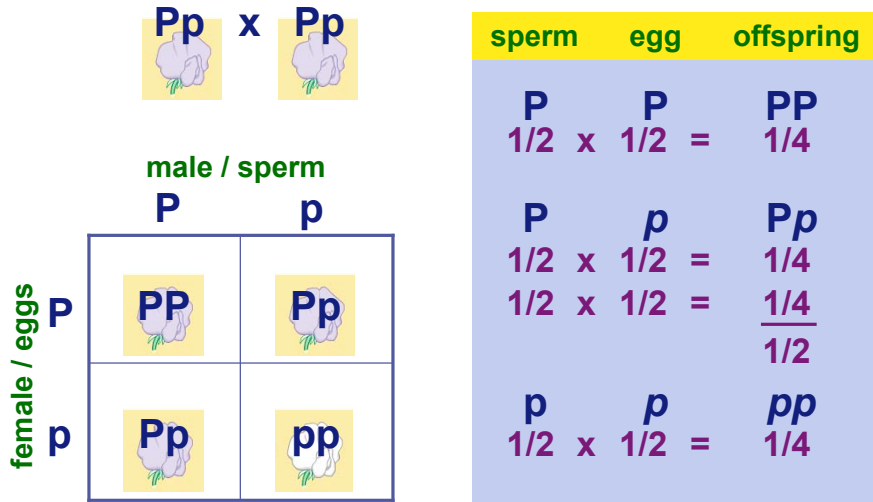


Probability & genetics

- Outcome of 1 toss has no impact on the outcome of the next toss
 - ◆ probability of tossing heads each time? **50%**
 - ◆ probability making a P gamete each time? **50%**



Calculating probability



Rule of multiplication

- **Chance that 2 or more independent events will occur together**
 - ◆ probability that 2 coins tossed at the same time will land heads up

$$1/2 \times 1/2 = 1/4$$

- ◆ probability of $Pp \times Pp \rightarrow pp$

$$1/2 \times 1/2 = 1/4$$


Calculating dihybrid probability

- Rule of multiplication also applies to dihybrid crosses
 - ◆ heterozygous parent — **YyRr**
 - ◆ probability of producing **yyrr**?
 - probability of producing **y** gamete = $1/2$
 - probability of producing **r** gamete = $1/2$
 - probability of producing **yr** gamete = $1/2 \times 1/2 = 1/4$
 - probability of producing a **yyrr** offspring = $1/4 \times 1/4 = 1/16$

Rule of addition

- Chance that an event can occur 2 or more different ways
 - ◆ sum of the separate probabilities
 - ◆ probability of $Pp \times Pp \rightarrow Pp$

sperm	egg	offspring
P	p	Pp
$1/2$	x $1/2$	= $1/4$
p	P	Pp
$1/2$	x $1/2$	= $1/4$



$1/4$
+ $1/4$
<hr/>
$1/2$

Chi-square test

- Test to see if your data supports your hypothesis
- Compare “observed” vs. “expected” data
 - ◆ is variance from expected due to “random chance”?
 - ◆ is there another factor influencing data?
 - null hypothesis
 - degrees of freedom
 - statistically significant