Genetics 2

- Send answer to iClicker 2A now
- Genes and Alleles
- Genetics Problems
- Answer to iClicker 2B at end of class

Labs start this week!

- Due in Lab – Pre-Lab 01

- Genetics Survey due Friday

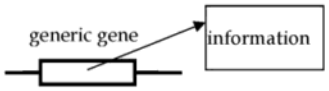
Bio 111 Gene & Allele Revisited

Take the case of round & wrinkled peas.

- The **gene** is responsible for the **character** - that is, the pea's shape.
- The **allele** is responsible for the **trait** of the character
  - that is, round ("R" allele) or wrinkled ("r" allele).

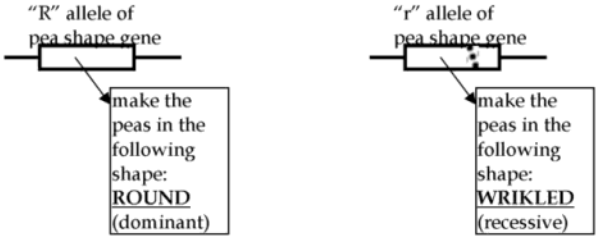
Another way to look at this:

1) A gene is a place for information to be kept:



2) All the alleles of the gene for pea shape have the same basic structure:

3) The different alleles differ in some of the information they contain.



4) So what are Mendel's "particles of inheritance" - the things that everyone has 2 of (one from mom & one from dad)? They are genes and alleles - actually, they are alleles of a gene. To use the example: An Rr individual might say, "I have two copies of the pea shape gene. I got one copy of this gene, in the R form, from my father and I got another copy, this one in the r form, from my mother." or, *"I have two copies of the pea shape gene. I got one copy of this gene, the R allele, from my father and I got another copy, this one the r allele, from my mother."*

5) A gene is not "made of alleles" (in the sense that a building is made of bricks), it is a place where alleles can be found. The gene contains information; different forms of that information are alleles.

6) 6) The combination of alleles present in an organism (its genotype) determines its appearance (phenotype) by a set of rules that can be listed as follows:

allele	contribution to phenotype
R	round peas (dominant)
r	wrinkled peas (recessive)

this information is equivalent to

genotype	phenotype
RR	round
Rr	round
rr	wrinkled

Solve Genetics Problems

note: in Bio111 → 1 gene / 1 character

① cross 1 tall × short

↓

F_1 ½ tall : ½ short

cross 2 F_1 short × F_1 short

↓

3 : 1 short : tall

> like a normal that explains the

⇒ give a model that explains the data

Steps: (A) make a model
(B) make predictions
(C) do your predictions fit all the data

if no ← | → if yes → done

ex 1. (A) since we have 2 traits; try a model w/ 2 alleles

allele	contribution to phenotype
T	tall (dominant) } simple
t	short (recessive) } dom.

(B) cross 1 tall × short
TT × tt
↓
predict all tall

tall = TT
= Tt

(C) observe: ½ tall & ½ short

⇒ does not match

try Tt × tt

	t	t
T	Tt	Tt
t	tt	tt

or

	t
T	Tt
t	tt

½ tall
½ short

try w/ cross 2 F1 short × F1 short
tt × tt

all short
does not match data

try new model

allele	contribute to phen.
S	short (dom.)
s	tall (rec.)

ex 2. red x blue → 3 colors

↓

all purple

2 alleles won't work for simple dom.

Incomplete Dominance

Model

allele	contribut. to phen.
R	red (incomplete dom.)
r	blue (")

note: Rr = purple

red x blue

RR x rr

↓

all purple → fits all our data

	R	R
r	Rr	Rr
r	Rr	Rr

---

ex 3 Blood type Known model → ~~unknown~~ genotype

mom type A x dad type B

↓

type O

question: give the genotypes of all 3

mom: $I^A I^A$ or $I^A i$

dad: $I^B I^B$ or $I^B i$

child: ii

4 possibilities

$I^A I^A \times I^B I^B$

	I^A	I^A
I^B	$I^A I^B$	$I^A I^B$
I^B	$I^A I^B$	$I^A I^B$

→ $I^A I^B$ → AB

Shortcut: only 1 allele from each parent

≠ fit data

$I^A I^A \times I^B i$

	I^B	i
I^A	AB	A

½ AB

$I^A i \times I^B I^B$

	I^B
I^A	AB
i	

$I^A i \times I^B i$

	I^B	i
I^A	AB	A
i		

$I^A I^A \times I^B i$

	I^B	i
I^A	AB	A

½ AB

½ A

$I^A i \times I^B I^B$

	I^B	
I^A	AB	
i	B	

½ AB

½ B

$I^A i \times I^B i$

	I^B	i
I^A	AB	A
i	B	O

mom = $I^A i$

dad = $I^B i$

child = ii