

## Complex Traits

### 1) Incomplete dominance

Let's assume that dragons show incomplete dominance for fire breathing. The **F** allele provides lots of fire and the **F'** allele gives no fire. (a) If a dragon that has very strong fire is crossed with a dragon that has moderate fire, what will their offspring be like? (b) Under what conditions can a baby dragon be born that never has fire? Justify your answer with Punnett Squares.

[Note:

- a) Parent dragons with FF (strong) and FF' (moderate) have a 50% chance of having a baby dragon with strong fire (FF) or with moderate fire (FF').
- b) A baby dragon with no fire (F'F') can be produced by two dragons with no fire (F'F' X F'F'), both with moderate fire (FF' X FF'), or one with no fire and the other with moderate fire (F'F' X FF').]

### 2) Codominance

Let's say that the color of merpeople's tail is controlled by a codominant gene and the alleles are blue (B) and green (G). Show a cross between two merpeople who have bluish-green tails (BG). Give the offspring phenotypes with percentages.

[Note: Between parents with BG and BG tail color genotype, their children have 50% chance having blue-green tails and 25% chance having blue or green tails.]

	B	G
B	BB	BG
G	BG	GG

### 3) Multiple alleles

The human blood cell surface protein has three alleles: A, B, and O. Could a person with B type blood and a person with A type blood ever have a baby with O type blood? Use Punnett squares to justify your answer.

[Note: The Punnett Square shows that there is a 25% chance of having a child with O blood type, as well as a 25% chance of having a child with A, B, or AB blood type.]

	B	O
A	AB	AO
O	BO	OO

### 4) Regulatory genes

If boggarts' ears are affected by a regulatory gene that silences (turns off) the expression of ears and if this silencing gene is dominant, what are possible genotypes of a baby boggart whose mom has ears but dad doesn't?

[Note:

Upper case S = dominant allele that silences ear gene = no ears

Lower case s = recessive allele that leaves ear gene to express = ears

Mom has ears = ss only; Dad has no ears = Ss or SS

	S	s
s	Ss	ss
s	Ss	ss

If dad has Ss, the baby boggart has a 50% chance of having Ss (no ears) or ss (ears).

If dad has SS, the baby boggart has a 100% chance of having Ss (no ears).]

	S	S
s	Ss	Ss
s	Ss	Ss