



DRAGON GENETICS LAB

Principles of Mendelian Genetics

Background

Dear **Dragon** parents – you will be working in pairs in the lab to produce a **Dragon** baby from the random mixing of genetic traits. (Each of you will be a surrogate **Dragon** parent!) Surrogate **Dragon** parent partners must be of the opposite sex, therefore one parent must pick up the double X chromosomes while the other must pick up the X/Y chromosomes. The homologous chromosomes will be separated according to Mendel's law of Independent Assortment. The genetic codes that are passed on to the baby will be recorded on the following pages. The surrogate parents must then decode the genes inherited to determine the phenotype traits of their baby. Each couple must then use the pictures at the end of the handout, to 'cut & paste' a picture of your baby, or, create your own picture / sketch of the baby based on the inherited traits.

Procedure

1. Each partner must pick up five Popsicle sticks -- one of each color of autosome, and one sex chromosome stick. Each side of a stick represents a chromosome, and the two sides together represent a pair of homologous chromosomes.
2. For each color autosome and then for the sex chromosomes, each parent will randomly drop his or her stick on the table. The side of the stick that is up represents the chromosome that is passed on to the baby.
4. The alleles from each pair of homologous chromosomes will be recorded in the data chart.
5. The dragon genome decoding chart indicates the phenotypic effect of each gene. The trait produced by each pair of alleles should be recorded in the data chart. Remember that a CAPITAL letter is dominant over a small letter [recessive] unless the decoding chart indicates those traits are codominant, sex-influenced, or sex-limited.
6. Produce a graphic of the baby, by either 'cutting & pasting, tracing an outline or by drawing your own. One graphic of the baby is needed per couple. The baby's colors will need to be added to the picture.

Questions

1. How does dropping the stick on the table and transcribing the letters on the sides facing up follow Mendel's **Law of Segregation**?
[First state the law.]
2. Explain how dropping the green, orange, and red sticks illustrates Mendel's **Law of Independent Assortment**? [First state the law]
3. The gene for fangs is recessive, yet most of the dragons have fangs. How can this happen? [Hint. The gene that causes dwarfism (*achondroplasia*) in humans is dominant.]
4. What is the sex of your baby?
5. What traits are *sex-linked*? [First define "sex-linked".]
6. Identify any gene deletions or inversions in the chromosomes you have.
7. What traits are *more likely* to be found in males? [Consider *sex-linked*, *sex-influenced* and *sex-limited* traits.]
8. How might these be an advantage to this sex? [Be creative in your answers.]
9. What traits are *more likely* to be found in females?
10. How might these be an advantage to this sex?

DRAGON GENOME

DECODING OF THE GENES

Chromosome	Dominant genes	Recessive genes
Green Autosome	A. no chin spike B. nose spike C. three head flaps D. no visible ear hole E. [see below]	a. chin spike b. no nose spike c. four head flaps d. visible ear hole
Red Autosome	F. long neck G. no back hump H. no back spikes I. long tail J. flat feet	f. short neck g. back hump h. back spikes i. short tail j. arched feet
Orange Autosome	K. red eyes L. spots on neck M. [see below] N. no fang O. spots on back	k. yellow eyes l. no spots on neck n. fang o. no spots on back
Yellow Autosome	P. no spots on thigh Q. green body R. small comb on head [see below] S. [See below] T. [See below]	p. spots on thigh q. purple body r. large comb on head
Sex Chromosomes	U. regular thigh V. four toes W. no chest plate	u. pointed thigh v. three toes w. chest plate
X Chromosome Only	X. no. tail spike Z. long arms + non-fire breather	x. tail spike z. short arms - fire breather
Y chromosome only	Y. male sex	

Codominant traits

E. eye pointed at each end	e. round eye	Ee. eye round at front only
S. Red spots	s. yellow spots	Ss. orange spots

Sex-influenced traits

M. wings	m. no wings [dominant in presence of male hormone]
T. no elbow spike	t. elbow spike [dominant in presence of male hormone]

Sex-limited traits

R or r Only males have the comb on the head.

