Bio 130 Worksheet 8 UNDERSTANDING GENETICS

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INTRODUCTION

A variety of offspring can be produced as a result of sexual reproduction. The types of traits possible in an offspring have been of interest to human for a long time. To understand how characteristics are passed from one generation to the next, we need to know some basic information. Every individual produced by sexual reproduction has two genes for each characteristic (trait). They receive one gene from each parent. However, there are alternate genes for the same characteristic known as **alleles**. For example, there are alternate genes for eye color; the blue eye allele and the brown eye allele. Some alleles, called **dominant alleles** are able to express a characteristic and mask the presence of other **recessive alleles**. If an individual has two identical alleles for a characteristic (two blue eye alleles or two brown eye alleles) it is **homozygous**. If the two alleles are different from one another (one brown eye allele and one blue eye allele) the individual is **heterozygous**. Therefore an individual may have some recessive alleles that do not express themselves but are still part of their genetic catalog. All the genes that an individual has are its **genotype**. The genotypes are usually written in the form of letters. The observable characteristics displayed in the organism's structure, behavior, or physiology is known as the organism's **phenotype**.

Scientists us a box figure (**Punnett Square**) to make predictions about various genetics problems. The Punnett Square allows you to determine the probability of obtaining each of the genotypes and phenotypes possible in the offspring resulting from a particular cross. The Punnett Square only shows the chances of what might occur each time the even is undertaken.

Please note: <u>Lower case letters (recessive allele) are written with a 1 as a subscript beside the letter.</u>

Simple Genetics Practice Problems

1. For each genotype, indicate whether it is heterozygous (HE) or homozygous (HO). (4)

AA _HO_____	Ee$_1$___HE___	Ii$_1$__HE_____	Mm$_1$___HE___
Bb$_1$ ___HE____	f$_1$f$_1$___HO____	Jj$_1$__HE_____	n$_1$n$_1$__HO_____
Cc$_1$___HE____	GG___HO___	k$_1$k$_1$___HO___	OO___HO___
Dd$_1$___HE____	HH___HO___	Ll$_1$___HE___	Pp$_1$_HE_____

2. For each of the genotypes below, determine the **phenotype**. (8)

Purple flowers are dominant to white flowers

PP___purple_____
BB____brown_____
Pp$_1$_____purple_____
Bb$_1$____brown_____
p$_1$p$_1$_____white_____
b$_1$b$_1$___blue_____

Brown eyes are dominant to blue eyes

Round seeds are dominant to wrinkled

RR___round_____
_____
Rr$_1$___round_____

Bobtails are recessive (Long tails dominant)

TT___long tails_

Tt$_1$__long tails

_____

r_1r_1_____wrinkled_____

t_1t_1_____bobtails_____

3. For each phenotype, list the **genotypes**. (Remember to use the letter of the dominant trait). (4)

Let S be dominant; s_1 be recessive
Straight hair is dominant to curly.
___*Ss*_____ straight
___SS_____ straight
___ss_____ curly

Let P be dominant; p_1 be recessive
Pointed heads are dominant to round heads.
_____PP_____ pointed
_____Pp_____ pointed
__pp_____ round

4. Set up the square for each of the crosses listed below. The trait being studied is round seeds (dominant) and wrinkled seeds (recessive).

4A) **Rr_1 x r_1r_1** (8+2=10pts)

	R	r
r	Rr	rr
r	Rr	rr

What percentage of the offspring will be round?

_____50%_____

4B) **Rr_1 x Rr_1** (8+2=10pts)

	R	r
R	RR	Rr
r	Rr	rr

What percentage of the offspring will be round?

____75%_____

4C) **RR x Rr_1** (8+2=10pts)

R	RR	RR
R	Rr	Rr

What percentage of the offspring will be

round?

r

____100%_____

Practice with Crosses. **SHOW ALL WORK**

5. A TT (tall) plant is crossed with a t_1t_1 (short plant). (8 +2=10pts)

	T	T
t	Tt	Tt
t	Tt	Tt

What percentage of the offspring will be tall? ____100%_____

6. A Tt_1 plant is crossed with a Tt_1 plant. (8 +2=10)

	T	t
T	TT	Tt
t	Tt	tt

What percentage of the offspring will be short? _____25%_____

7. A heterozygous round seeded plant (Rr_1) is crossed with a homozygous round seeded plant (RR). (8 +2=10)

	R	r
R	RR	Rr
	Rr	Rr

What percentage of the offspring will be homozygous (RR)? _____25%_____

8. A homozygous round seeded plant is crossed with a homozygous wrinkled seeded plant. What are the genotypes of the parents? (2 + 8 = 10)

_____ x _____

R	R
Rr	Rr
Rr	Rr

What percentage of the offspring will also be homozygous? _____0%_____ (2)

9. In pea plants, purple flowers are dominant to white flowers. If two white flowered plants are crossed, what percentage of their offspring will be white flowered? _____0%_____ (2+8= 10)

Let **P** be **dominant** allele and $\mathbf{p_1}$ be **recessive** allele.

Show your work.

Pp	Pp
Pp	Pp

10. In guinea pigs, the allele for short hair is dominant.

Let **S** represent **dominant** allele and $\mathbf{s_1}$ represent **recessive** allele

What genotype would a **heterozygous** short haired guinea pig have? ___SS_____ (1)

What genotype would a long- haired guinea pig have? _____ss_____ (1)