Inheritance lab

Inheritance Lab Report _____ _____ Up

d 5/15 Purpose To develop and apply an understandingMendelian inheritance patterns and Punnett squares.

Preparation (4 points)

Review the background document on inheritance and describe the concepts of dominant and recessive alleles, gametes, phenotype and genotypes.

Materials and Methods

Read the Inheritance Lab Background materials. No other materials are required for this lab. You will observe a variety of phenotypic characteristics in yourself and record these in the table in the Results section below. Using the logic of Mendelian genetics, you will then record your possible genotypes, as well as your parents' possible genotypes. Do not refer to your parent's phenotypes in order to infer the possible crosses that could have led to your phenotype.

Complete the following steps, and record your findings in the table in the Results section.

1. Record each of your phenotypes in the Your Phenotype column. Identify your phenotype using a single letter for each trait as indicated below (capital letter indicates dominant allele, lowercase indicates recessive allele):

E – free earlobes; e – attached earlobes

D – dimples; d – no dimples

T – able to roll tongue; t – not able to roll tongue

F – second toe longer than big toe; f – second toe shorter than big toe

W – widow's peak; w – no widow's peak

2. Identify and record your possible genotypes based on your phenotypes.

Genotypes are represented using two alleles. Identify the alleles using the letters indicated below (capital letter indicates dominant allele, lowercase indicates recessive allele):

E – free earlobes; e – attached earlobes

D – dimples; d – no dimples

T – able to roll tongue; t – not able to roll tongue

F – second toe longer than big toe; f – second toe shorter than big toe

W – widow's peak; w – no widow's peak

3. Using your possible genotypes, identify and record all of the possible pairings of parental genotypes that could have led to your possible genotypes. Crosses are denoted in this form: FF x Ff and indicates the genotypes of both parents. You should list all of the possible crosses that could lead to your phenotype.

Preliminary Analysis (4 points)

Describe how a genetic trait can skip one or more generations without being apparent. How might one learn about unseen alleles in a child's parents by observing traits in the child?

Results (26 points)

Use the chart below to record the observations of your phenotypes and to record your inferences regarding your genotype and all of the possible crossings of parental genotypes that can account for your genotype. Phenotypes are expressed with a single letter related to the trait. Genotypes include both alleles and are, thus, expressed with two letters (one for each allele). Possible parental genotypes and crosses consist of two genotypes crossed. For instance, a freckled person will have a phenotype of F and

possible genotypes of FF and Ff. One of the possible parental genotype and crosses is (FF x Ff). Be sure to list all possible parental genotypes in terms of possible crosses. Crosses are denoted in this form: FF x Ff and you should list all of the possible crosses that could lead to your phenotype.

Physical Characteristic

Your Phenotype

Your Genotype or Possible Genotypes

All Possible Parental Crosses

Earlobes: Free or Attached

E

EE, Ee

EE×EE, EE×Ee, EE×ee, Ee×Ee

Dimples

d

dd

dd×dd, Dd×Dd, Dd×dd

Tongue Rolling

T

TT, Tt

TT×TT, TT×Tt, TT×tt

Second Toe Longer Than Big Toe on Foot

f

ff

ff×ff, Ff×Ff, Ff×ff

Widow's Peak

w

ww

ww×ww, Ww×Ww, Ww×ww

Analysis (12 points)

It was observed that the presence of a dominant gene in the genotype always led to the expression of the dominant trait, which is seen as the phenotype. In addition, the occurrence of a certain genotype could result from the crossing of several possible parental genotypes. This lab provided knowledge that recessive traits were denoted by small letters while dominant traits were denoted by capital letters. One component of my genotype came from each parent due to the process of meiosis. Meiosis is a type of cell division that takes place in eukaryotic cells and leads to the formation of gametes (Kratz, 2009). During meiosis, the parental genotypes are halved by the division of the number of chromosomes to form gametes. The succeeding process of fertilization brings together haploid number of chromosomes in the parental gametes to form a diploid zygote. As a result, the genotype of an offspring includes one component from each parent. Punnett squares are utilized in the visualization of the probabilities of inheriting a certain gene. When the parental genotypes have dominant and recessive traits, a Punnett square shows the offspring that are likely to inherit two dominant genes, two recessive traits or a mixture of the two (Ireland, 2010). Mendelian logic implies that a dominant attribute trait is one that manifests even when the second copy of the gene for that particular trait differs. Conversely, a recessive attribute is one that only manifests when two copies of its gene are present. For instance, the trait for free

earlobes (E) is dominant over attached earlobes (e). Therefore, if a person has one gene for free earlobes and another copy for the attached earlobe, the result is free earlobe. Therefore, Mendelian logic is helpful in determining the possible genotypes of an offspring.

Conclusion (4 points)

I learned from this lab that recessive traits were shown by small letters while dominant traits were indicated by capital letters. This experiment showed that the phenotype of a person was always as a result of a dominant gene in the person's genotype or two copies of a recessive trait. One copy of an offspring's genotype came from each of the parents. The cellular process of meiosis made it possible to inherit a copy of each gene from both parents. Meiosis was a process of cell division that led to the production of gametes with half the total number of chromosomes (haploid). The union of two haploid gametes from the egg and sperm led to the formation of a zygote with the required number of chromosomes. Mendelian logic guided the determination of parental and offspring genotypes and phenotypes. In addition, a Punnett square made it easier to determine the probability of inheriting a certain gene.

Overall, this lab enabled the understanding of recessive and dominant traits in an offspring with respect to parental genotypes. The occurrence of a certain genotype was not obvious due to the varying distribution of parental genotypes in the offspring. However, the lab was not clear about the mechanisms of crossing and the probabilities of having offspring with certain phenotypes (traits). Therefore, future experiment could look at the probabilities of obtaining certain phenotypes when various parental

genotypes are crossed.

References

Kratz, R. F. (2009). Molecular and cell biology for dummies. Hoboken, NJ:

John Wiley & Sons.

Ireland, K. A. (2010). Visualizing human biology. Hoboken, NJ: John Wiley &

Sons.