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# ***Human Inheritance – Lab #22***

**Background:** By now you have most likely discussed the basics of genetics, especially those that were described by Gregor Mendel, the Austrian monk that is commonly referred to as the "father of classical genetics". Many of these traits are influenced by several pairs of genes and the possibilities are seemingly limitless. For this activity we will assume that the traits we are studying are regulated by the alleles of only one gene, however most are governed by several genes. Each of these traits comes from the genes contributed to the embryo from both the mother and the father.

**Laboratory Safety Precautions:** The following symbols represent the precautions that are required for this lab:

There are no precautionary measures needed in this laboratory exercise.

**Purpose:** the purpose of this laboratory experience is:

-to understand the mechanism of inheritance.
-to determine your phenotype for several traits.
-to be able to determine your genotype (as far as possible) for these traits.
-to interpret the genotypes of individuals in a pedigree.

**Materials:** The following materials are required to complete this lab experience:

-lab papers -pen or pencil
-PTC paper (your teacher will supply this)

**Procedure:** The following procedure is utilized to perform this experience:

1. Working in pairs, observe the features expressed in this lab and complete the table included that shows the different features listed below:
2. The next several pages show the features you will be looking for as you observe the traits. In each case, circle the trait that YOU exhibit! Those features that do not include a picture and are shaded will be explained to you by your teacher as they are difficult to portray accurately.

| Feature Name | Dominant | Heterozygous | Recessive |
|---|---|---|---|
| Shape of Ear Lobe |  Free |  Free |  Attached |
| Eye Color | Brown, hazel, green | Brown, hazel, green | Blue |

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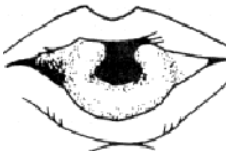
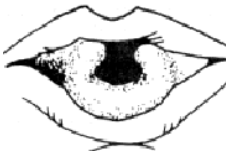
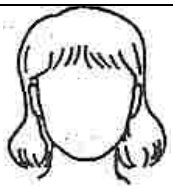
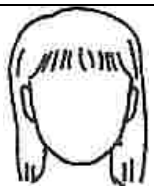
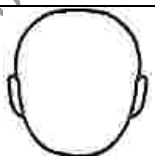
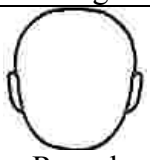
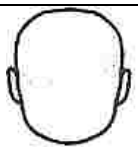
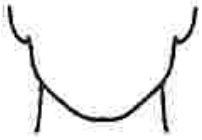
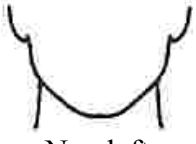
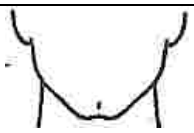
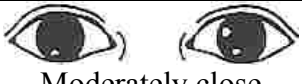
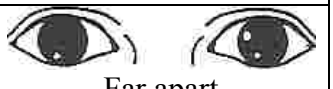
| | | | |
|---|---|---|---|
| Shape of hairline |  Widow Peak |  Widow Peak |  No Widow Peak |
| Ability to roll tongue |  Roller |  Roller |  Non-roller |
| Ability to fold tongue | Folder | Folder | Non-folder |
| Shape of little finger | Bent | Bent | Straight |
| Ability to taste PTC | Can taste PTC | Can Taste PTC | Cannot taste PTC |
| Mid-Digital hair | Has MD Hair | Has MD Hair | No MD Hair |
| Hair curliness |  Curly |  Wavy |  Straight |
| Eyelash length |  Long |  Long |  Short |
| Face shape |  Round |  Round |  Square |
| Chin cleft |  No cleft |  No cleft |  Cleft present |
| Eye spacing |  Close together |  Moderately close |  Far apart |

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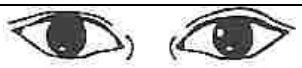
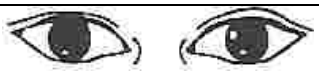
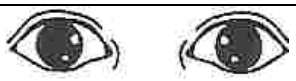
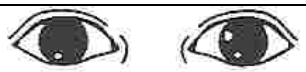
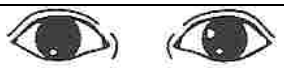
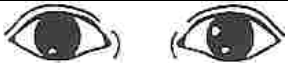
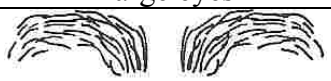
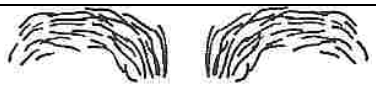
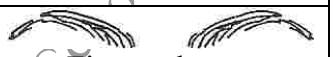
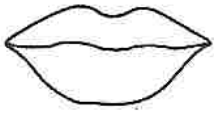
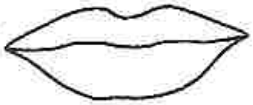
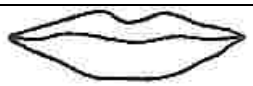
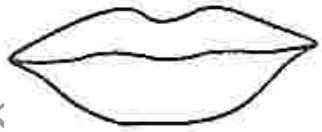
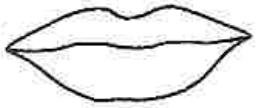
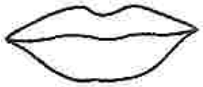
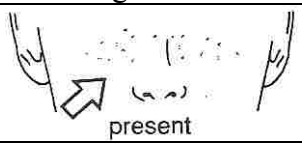
| | | | |
|---|---|---|---|
| Eye shape |  Almond shaped |  Almond shaped |  Round shaped |
| Eye position |  Eyes Straight |  Eyes Straight |  Eyes Slanting |
| Eye size |  Large eyes |  Medium eyes |  Small eyes |
| Eyebrow shape |  Bushy Eyebrows |  Bushy Eyebrows |  Fine eyebrows |
| Eyebrow position |  Non-Connected |  Non-connected |  Connected |
| Nose size |  Large nose |  Medium nose |  Small nose |
| Lip shape |  Thick Lips |  Medium thickness lips |  Fine lips |
| Ear size |  Large ears |  Medium ears |  Small ears |
| Mouth size |  Large Mouth |  Medium Mouth |  Small mouth |
| Freckles |  present |  present |  No freckles |
| Dimples | No dimples | No dimples | Dimples |
| Finger Interlock | Right over left | Right over left | Left over Right |
| Arm fold | Right over left | Right over left | Left over Right |
| Left/right footed | Right footed | Right footed | Left Footed |

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| Hitch hiker's thumb |  Hitchhikers thumb |  Hitchhiker's thumb |  Straight Thumb |
|---|---|---|---|

**Data:** The following data was collected during this lab experience:

| Trait and Symbols for Genes | Phenotype | Genotype |
|---|---|---|
| Shape of ear lobe (LL, Ll, ll) | | |
| Eye color (BB, Bb, bb) | | |
| Shape of hairline (WW, Ww, ww) | | |
| Ability to roll tongue (RR, Rr, rr) | | |
| Ability to fold tongue (FF, Ff, ff) | | |
| Shape of little finger (CC, Cc, cc) | | |
| Ability to taste PTC (PP. Pp, pp) | | |
| Mid-Digital hair (HH, Hh, hh) | | |
| Hair curliness (CC, Cc, cc) | | |
| Eyelash length (LL, Ll, ll) | | |
| Face shape (SS, Ss, ss) | | |
| Chin cleft (DD, Dd, dd) | | |
| Eye spacing (NN, Nn, nn) | | |
| Eye shape (RR, Rr, rr) | | |

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| | | |
|---|---|---|
| Eye position<br>(PP, Pp, pp) | | |
| Eye size<br>(ZZ, Zz, zz) | | |
| Eyebrow shape<br>(BB, Bb, bb) | | |
| Eyebrow position<br>(PP, Pp, pp) | | |
| Nose size<br>(NN, Nn, nn) | | |
| Lip shape<br>(KK, Kk, kk) | | |
| Ear size<br>(EE, Ee, ee) | | |
| Mouth size<br>(MM, Mm, mm) | | |
| Freckles<br>(FF, Ff, ff) | | |
| Dimples<br>(DD, Dd, dd) | | |
| Finger Interlock<br>(II, Ii, ii) | | |
| Arm folding<br>(AA, Aa, aa) | | |
| Left/right footed<br>(FF, Ff, ff) | | |
| Hitchhiker's thumb<br>(VV, Vv, vv) | | |

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**Conclusion:** The following can be concluded from this lab experience:

_____

_____

_____

_____

_____

_____

**Analysis Questions:** Answer the following questions in the space provided.

1. Do you think anyone in class will have the same exact traits as you? Explain.

   _____

   _____

   _____

   _____

2. Why is it not always possible to determine exactly what your genotype is ?

   _____

   _____

   _____

   _____

3. Do you think you will share common genetic traits with your parents? …your grandparents? Why?

   _____

   _____

   _____

   _____

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4. There are communities in Spain and also in Pennsylvania where polydactyly (extra toes and or fingers) is a common trait. Why does this trait tend to be passed on from generation to generation?

_____

_____

_____

_____

5. There have been many cases in history wherein a king divorces (or sometimes kills) his wife since she produces only daughters that cannot take over the throne when he dies. Why is this, genetically, an incorrect move?.

_____

_____

_____

_____



## Sources of Images Used

Shape of Ear Lobes: http://www.usoe.k12.ut.us/curr/science/core/bio/biotestpool/Bio_S4_2.htm

Ability to roll tongue:
http://www.csun.edu/~vceed002/biology/genetics/genetics_activity/genetics_class.htm

Hitchhiker's thumb:
http://www.csun.edu/~vceed002/biology/genetics/genetics_activity/genetics_class.htm#thumb

The following images were taken from Miller and Levine's Laboratory Manual, Copyright 2000, Prentice Hall Publishers, ISBN0-13-436796-0: Hair Curliness, Face Shape, Chin Cleft, Eye Spacing, Eye Shape, Eye Position, Eye Size, Eyelash Length, Eyebrow Shape, Eyebrow Position, Nose Size, Lip Shape, Ear Size, Mouth Size, Freckles, Dimples, Shape of Hairline