

Human Traits

Determine your phenotype for each of the human traits listed below. You may do this by yourself for most of them, but you will need the help of a partner for a few. Determine your phenotype as accurately as possible.

For each of the traits listed record your phenotype and genotype in the table on the worksheet provided. Be sure to use the letter symbols for alleles for the genotypes shown on the appropriate section of the worksheet.

For some of the more easily observed traits, you may be able to recall the phenotypes of your parents and your siblings which could help you to determine your genotype if you have the dominant phenotype. If you have the dominant phenotype and do not know the phenotypes of your parents, give both possibilities for your genotype, since it cannot be determined definitely. Obviously, you are either homozygous (AA or aa) or heterozygous (Aa), but you cannot determine which so you may write both down in the box for genotype.

This exercise emulates what genetic counselors do. They try to determine what a parent's genotype is based on their phenotype and the phenotypes of their relatives. This information can then be used to determine the risk of a couple having a child with a particular genetic disorder.

Ability to taste PTC (Phenylthiocarbamide)

Obtain a piece of paper which has been treated with PTC or thiourea. On the average, seven people out of ten who chew up a bit of this treated paper will detect a definite taste. It may be sour, bitter, or sweet. Others will detect only a paper taste. The ability to taste either of these chemicals is dominant to the inability to taste them.

Sodium benzoate taste

Obtain a sodium benzoate taste strip and chew it. A different pair of alleles determines the ability to taste sodium benzoate (as opposed to PTC taste). If you can taste it, you have at least one of the dominant alleles (S). If not, you are homozygous recessive (ss) for the trait. Also record whether sodium benzoate tastes, salty, bitter, or sweet to you (if a taster). Even though PTC and sodium benzoate taste are inherited independently, they interact to determine a person's taste sensations. Individuals who find PTC bitter and sodium benzoate salty tend to be devotees of sauerkraut, buttermilk, spinach, and other slightly bitter or salty foods.

Widow's Peak

The presence of a point of hair in the middle of the hairline is called a widow's peak and is dominant to the straight hairline.

Freckles

The presence of freckles is dominant to the absence of freckles.

Cleft Chin or Chin Dimple

Cleft chin is variable in expression but, in most people, produces a deep dimple in the midline of the chin. This dimpling effect is dominant to the absence of the dimple.

Earlobes

In most people the earlobe hangs free, but in some individuals it is directly attached to the side of the head. Attached earlobes is the recessive trait.

Hitchhiker's Thumb

Hyperextensibility of the thumb (Hitchhiker's thumb) is recessive to straight thumb. This can be determined by examining the position of your thumbs when they are in a relaxed position. When this condition is present, the usual position of the thumb is bent backward toward the wrist; there may be as much as a 45-degree angle between the two joints.

Bent Little Finger

Hold your hands in front of your face with the palms toward you, pressing the little fingers together. If the two fingers are straight, they will be parallel to one another throughout their lengths (no light will show through and no space will be seen between the little fingers); in the bent finger condition, the terminal portions flare away from one another. The bent finger is dominant to the straight finger.

Short Second Finger

Place your hand on a flat surface with the palm down and observe the relative lengths of the second and fourth fingers. (The thumb is the first finger.) There are two conditions possible. Either the second finger is shorter or it is longer than the fourth finger. Shorter finger (K) is dominant to longer second finger (k). This is a sex-influenced trait. Sex-influenced means that a dominant gene in the heterozygous condition is influenced by a sex hormone such that it may behave as a recessive allele. A heterozygous condition (Kk) in the male results in a shorter second finger. The heterozygous condition (Kk) in the female results in a longer second finger.

| Trait | Possible Phenotypes | Associated Genotypes | Your Phenotype | Your Genotype |
|------------------------------|----------------------------|-----------------------------|-----------------------|----------------------|
| Ability to taste PTC | Taster | PP or Pp | | |
| | Non-taster | pp | | |
| Widow's Peak | Widow's peak present | WW or Ww | | |
| | Widow's peak absent | ww | | |
| Freckles | Freckles present | FF or Ff | | |
| | Freckles absent | ff | | |
| Cleft Chin (aka chin dimple) | Cleft present | CC or Cc | | |
| | Cleft absent | cc | | |
| Earlobe Attachment | Free earlobe | EE or Ee | | |
| | Attached earlobe | ee | | |
| Mid-Digit Hair | Hair present | MM or Mm | | |
| | Hair absent | mm | | |
| Hitchhiker's Thumb | Straight thumb | TT or Tt | | |
| | Hitchhiker's thumb | tt | | |
| Bent Little Finger | Bent finger | LL or Ll | | |
| | Straight finger | ll | | |
| Short Second Finger | Second finger shorter | KK or Kk (males) | | |
| | Second finger longer | Kk (females) or kk | | |
| Sodium benzoate taste | Taster | SS or Ss | | |
| | Non-Taster | ss | | |