

Purpose: To study inheritance of some human traits and determine the frequency of selected traits, examine some gene maps for humans, and to predict the ratio of blood types given the genotypes of the parents.

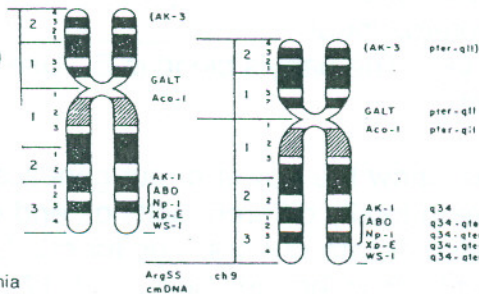
Materials: PTC tasting paper

Methods: Part A: Some human traits and their frequency.

1. Read the short description for each trait. Determine which trait you have (your genotype), record this in results. When recording genotype, use only a single symbol to indicate dominance since you do not know whether you are homozygous or heterozygous for the trait. Record the class data for each characteristic. Determine the ratio of dominant to recessive genes.

- Attached Ear Lobe:** In most people, the ear lobes hang free. But when a person is homozygous for a certain recessive gene(e), the ear lobes are attached directly to the side of the head.
- Widow's Peak:** In some people, the hair line drops downward and forms a distinct point in the center of the forehead. It results from the action of a certain dominant gene (W).
- Tongue Rolling:** A dominant gene (R) gives some people the ability to roll the tongue into a U - shape when the tongue is extend from the mouth. Nonrollers (r) can do no more than produce a slight downward curve of the tongue when it is extended from the mouth.
- Bent little Finger:** A dominate gene (B) causes the last joint of the little finger to bend inward toward the fourth finger. Lay both hands flat on the table, relax the muscles and note whether you have a bent or a strait little finger.
- PTC tasting:** Place a piece of PTC paper on your tongue or if you detect no taste, chew the paper. If you still detect no obvious taste, you are a nontaster and are homozygous for a recessive gene (t). The tasting of this chemical results from the presence of a dominant gene (T).

Part B: Genes on the Human chromosome:



- Each chromosome is made up of two things called?
- Examine human chromosome pair number nine. Does one chromosome of the pair, contain the same gene sequencing as the other chromosome?
- What does gene ABO represent?
- Do both members of the pair have to have the dominant form?

Part C: Genes for human blood types

AA or AO produce type A blood - $I^A I^A$ (homozygous) or $I^A i$ (heterozygous)
 BB or BO produce type B blood - $I^B I^B$ (homozygous) or $I^B i$ (heterozygous)
 OO produce type O blood (no antigen) - ii (homozygous) AB produce type AB blood (both antigen) $I^A I^B$ (hetero.)

- A homozygous male with blood type A is married to and has children with a heterozygous female with blood type B. Predict the offspring using a Punnett square.
- A male with O blood type is married to and has children with a female with AB blood. Predict the offspring using a Punnett square.
- Below each Punnett square indicate the ratio of blood type's these children would have.

9. (to region):
 λ K-3 adenylate kinase-3 (nucleoside TPase)
 GALT hexose-1-phosphate uridylyltransferase (GaPUT, Gal1PUT)
 λ co-1 (ACON-S) cytopl aconitase
 λ K-1 adenylate kinase-1
 λ BO ABO blood group
 λ p-1 nail-patella syndrome-1
 λ P-E xeroderma pigmentosum, Egyptian
 λ S-1 Waardenberg's syndrome, type 1
9. (to chm.)
 λ ArgSS arginosuccinate synthetase, citrullinemia
 λ mDNA plasma membrane DNA (DNACM)

Results: **Part A: Some human traits and their frequency.**

trait	genotype	dominant	recessive	ratio
ear lobes				
Widow's peak				
tongue rolling				
bent little finger				
PTC tasting				

Part B: Genes on the Human chromosome

- two parts: _____
- sequencing: _____
- ABO : _____
- dominant: _____

Part C:

1.				2.			

ratios: _____ ratios: _____

Conclusions:

- In part A, to what extent do the ratios obtained compare to Mendelian ratios previously studied?
- Explain why the ratios may vary?
- Could two parents who are tasters have a child who is a nontaster for PTC?

Explain:

- Does chromosome pairs contain the same sequence of ~~chromosomes~~^{genes} on each?
- What is the difference (if any) between the corresponding genes in the gene pair?

Discussion:

- Are most human traits one allele or multiple alleles?
- When mapping genes on a chromosome you indicate what gene is present in a certain place (you don't record if it's dominant or recessive). Is it therefore necessary to draw the pair of chromosomes when mapping them. Explain.

3. Imagine that you are a lawyer for a child custody case. The father claims that he was not the father for this child. The so called father has heterozygous type A blood, the mother has type AB blood. The baby's blood is B. Use a Punnett square to determine if the father is telling the truth.

4a. Many studies, especially twin studies, show the power of our genetics. Some twins that have been separated at birth and live in totally different settings end up later in life living almost identical lives. Our genes also dictate our cravings for our "sinful nature", (along with the devils help). What conflict is described in Galatians 5:17. (Quote some of the expressions of this battle).

4b. Quote portions of Galatians 5:24 that describes what happens to our sinful nature when we accept, or belong to Christ Jesus.

4c. Even with the change of belonging to Christ Jesus, our genetic predisposition for our sinful nature fights back. Write out Ephesians 6:13 which describes how we can fight our genes that try to make us sinful.