

Matters of Sex and Other Complex Things

Chromosomal Sexual Identity

- Some organisms, males are the homozygous and females the heterozygous (female birds have ZW, males ZZ)
- Some organism (like most plants) are hermaphroditic
- *C. elegans*
 - Males – Only testies have one X
 - Hermaphrodites – both testies and ovaries, have two X chromosomes
- Some organisms have other influences to determine which sex they become.
- Humans
 - XX = female
 - XY = Male
- **SRY** – Sex determining Region of the Y – begins sex differentiation into male.
 - (7th week)

X-Linked Recessive

- On X chromosome, its recessive
- Males get one X, females 2
- If males have allele, they have it.
- Women can be carriers
- Ex. Ichthiosis

X-linked Dominant

- On X chromosome, its dominant
- Conditions are usually more severe in males because of only one X,
- In females, other lessens severity
- Ex. Hypertrichosis

X Inactivation

- Early in development, one X chromosome in each cell is turned off
- Its random, so some of each persists, and makes things okay
- Makes female and male have equivalent amount of DNA activated
- Ex. Calico cats – cells stay put more than humans
 - One x is orange, one is black (white is an autosomal gene)

Y Linked

- On Y chromosome
- Few things there

An Individual's Sex can Influence the Phenotype

- Expression of autosomal genes for a certain phenotype can depend on the hormone constitution of the individual.
 - Thus, one phenotype may be expressed in males and another in females.
- **Sex Influenced**
 - Sex of an individual influences the expression of a phenotype.
 - Allele is dominant in one sex and recessive in another
 - Ex. Pattern baldness – dom in males, rec in females
- **Sex-Limited**
 - Expression of a phenotype is limited to one sex.
 - Ex. Beard growth/Breast size
 - Either parent can give, but only affects one gender

Complex Traits

- Do not follow Mendel's laws, but have a genetic component
- **Polygenic traits**
 - Determined by more than one gene
 - Aka quantitative
- **Multifactorial Traits**
 - Determined by one or more genes and the environment

- Ex. Fingerprints, height, skin color
- Bell Curve
- Environment – position in the uterus, experiences, exposure to infections
- **Empiric Risk**
 - Prediction of recurrence based on the traits incidence in a specific population
 - Increases with number of affected family members, how closely related to affected individuals
- **Heritability**
 - Estimate of the proportion of phenotypic variation is do to genes
 - = double the difference of the percentage variation between the groups
- **Coefficient of Relationship**
 - % of genes two related people share

Studying Traits

- **Adopted Individuals**
 - Similarities between adopted and adopted parents is due to environment
 - Between adopted and biological parents is genetic
- **Twins**
 - Identical or Monozygotic twins have same DNA
 - Fraternal or Dizygotic have different DNA
 - Compare two groups
 - Study separated twins