

The basics concepts of DNA: Part III Heredity

US275 Scientific Ethics
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Hereditary traits are passed from parents to offspring.

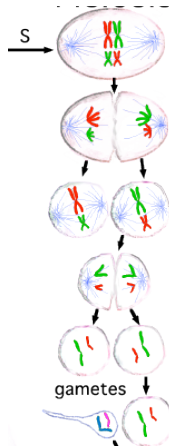
- Genetics
 - study of how biological information is passed from one generation to the next.



2

Meiosis is specialized cell division that results in the creation of gametes

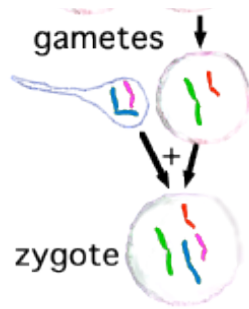
- normal body cell
 - two sets of chromosomes
- gametes
 - egg and sperm
 - only one set of chromosomes



3

The process of fertilization reestablishes two sets of chromosomes in the zygote.

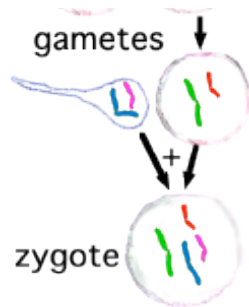
- sperm with 1 set of chromosomes
- + egg with 1 set of chromosomes
- zygote with 2 sets of chromosomes



4

Offspring have a combination of traits from both parents.

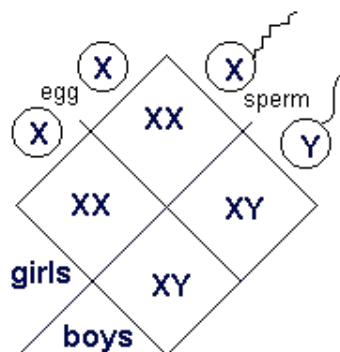
- 1 set of chromosomes from mother
 - DNA molecules and genes from mother
- 1 set of chromosomes from the father
 - DNA molecules and genes from father



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Gender is an example of a genetic trait.

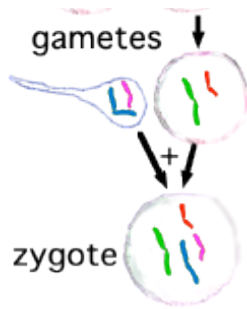
- Male
 - X and Y chromosomes
 - sperm have either X or Y chromosome
- Female
 - XX chromosomes
 - egg cells only have an X chromosome



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The offspring receives one allele from the mother and one from the father.

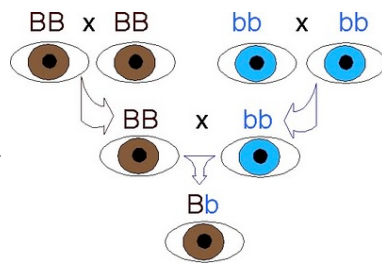
sperm with 1 set of chromosomes
 + egg with 1 set of chromosomes
 zygote with 2 sets of chromosomes



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With two different alleles, the information from one may be hidden.

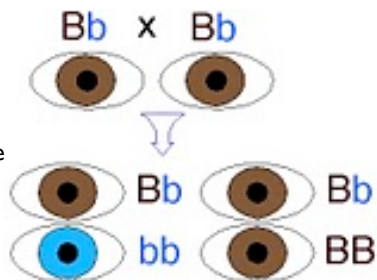
- Dominant allele
 - an allele that covers up another allele
 - trait expressed over another
- Recessive allele
 - trait that is hidden



<http://gaymarriedcalifornian.blogspot.com/2010/03/genetics-and-orientation-2.html>

The information in the recessive allele is hidden but not lost.

- The recessive alleles remain on the chromosome
 - can be expressed when not covered by the dominant allele
 - can show up in a future generation

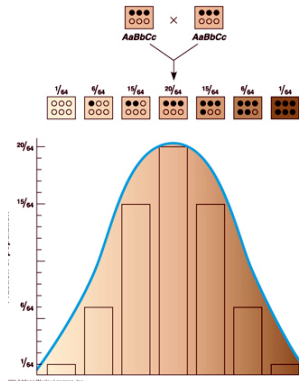


<http://gaymarriedcalifornian.blogspot.com/2010/03/genetics-and-orientation-2.html>

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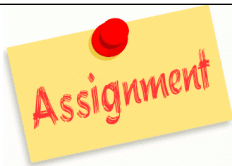
Some traits such as height, skin color and IQ are controlled by more than one gene.

- polygenic inheritance
 - many genes contribute to the trait
- environmental factors
 - contribute to variability of the trait



<http://canada.canacad.ac.jp/Biology/BHL1/3093>

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Assignment

Roll the dice

For many basic genetic traits, Genetic Counselors are able to use simple probability to determine the likelihood of having a child with a specific trait. Many recessive genetic medical conditions can also be examined in the same way when it is known that one or both of the parents may be a carrier for the specific trait.

In your discussion group:

Discuss whether or not it is ethical for parents that are carrying the allele for a debilitating genetic condition to attempt to have a child. Assume that the parents know that there is a 25% (1 out of 4) chance of having a child with the genetic disorder and a 75% (3 out of 4) chance of having a healthy child. Do the ethical arguments change if the likelihood of having a healthy child increases or decreases?

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Readings

The New Genetics (2010). NIH Publication 10-662. National Institute of General Medical Sciences. National Institutes of Health.

Chapter 1. How Genes Work, pp. 4 - 23
<http://publications.nigms.nih.gov/thenewgenetics/>

Help Me Understand Genetics: Cells and DNA (2012). National Library of Medicine, National Institutes of Health. Reprinted from Genetics Home Reference (<http://ghr.nlm.nih.gov/>)
<http://ghr.nlm.nih.gov/handbook/basics.pdf>



Lady Reading in an Interior
 Marguerite Gérard, 1795

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Any Questions?

Email me at:
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<http://www.vipitbullkennels.com/images/animated-question-mark.gif>