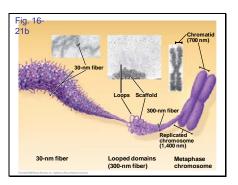
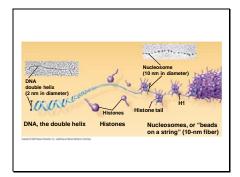


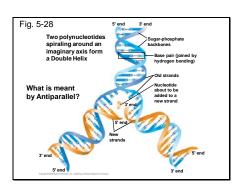
# Slide 2

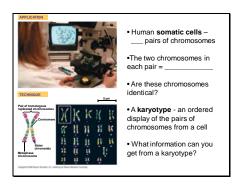
# Key Terms and Definitions 1 Genome Chromosome Gene Locus Genotype Phenotype Phenotype Heredity Variation Cryptic 280 Favos Bargain Commage



# Slide 5





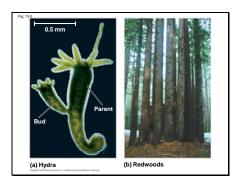

DNA inherited by organisms lead to specific traits

Which of the following illustrate genotype? Phenotype?

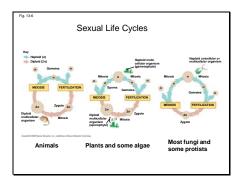
Nucleotide #17 - Adenine (A) is replaced by Thymine (T), resulting in a Val for Glu substitution at amino acid #6.

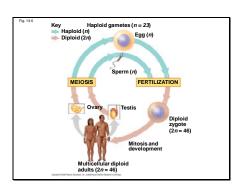
# Slide 8

# Key Terms and Definitions 2 Life cycle Genetic inheritance Asexual reproduction Clone Sexual reproduction Gametes Fertilization Somatic cells Allele




Slide 10





# Slide 12

#### The Animal Life Cycle

- $\bullet\,$  The sex chromosomes are called X and Y
- Human females have a homologous pair of X chromosomes (XX)
- Human males have one X and one Y chromosome
- The 22 pairs of chromosomes that do not determine sex are called **autosomes**


#### The Animal Life Cycle

- A diploid cell (2n) has two sets of chromosomes
- n = # of chromosomes in a gametes
- For humans, the diploid number is 46 (2n = 46)

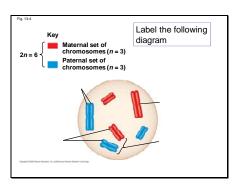
  (Fruit flies 2n = 8, Dogs 2n = 78)

Polyploidy = more than 2 sets of chromosomes (common in plants)

Are humans ever polyploids?

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# Slide 14



# Slide 15

# The Animal Life Cycle

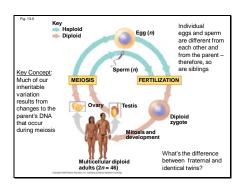
- A gamete (sperm or egg) contains a single set of chromosomes, and is haploid (n)
- For humans, the haploid number is 23 (n = 23)
- Each set of 23 consists of 22 autosomes and a single sex chromosome
- In an unfertilized egg (ovum), the sex chromosome is X
- In a sperm cell, the sex chromosome may be either X or Y


#### The Animal Life Cycle

- Fertilization is the union of gametes (the sperm and the egg)
- The fertilized egg is called a zygote and has one set of chromosomes from each parent
- The zygote produces somatic cells by \_ and develops into an adult

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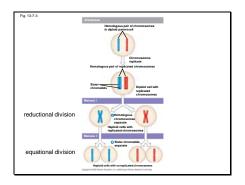
#### Slide 17



# Slide 18

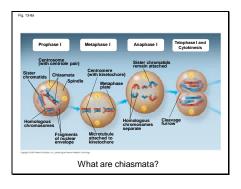
#### The BIG PICTURE of Meiosis

- · One Interphase just like Mitosis
  - G1, S-Phase, G2
  - diploid 46 chromosomes replicate to form 92 sisters joined in pairs
- Followed by Two Cell Divisions instead of One
  - In meiosis I, homologous chromosomes separate resulting in two haploid daughters with 46 sisters joined in 23 pairs
    - it is called the reductional division
  - In meiosis II, sister chromatids separate resulting in four haploid daughters with 23 unjoined chromosomes (much like mitosis)
    - it is called the **equational division**

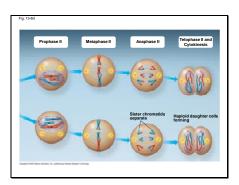
# Slide 20

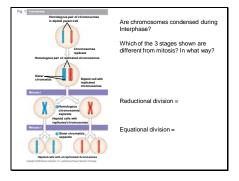
Remind me what prophase is again......



Remind me what telophase is again......

# Slide 23



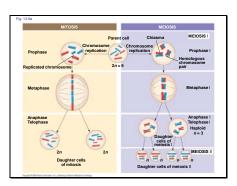



#### A Comparison of Mitosis and Meiosis

- Mitosis conserves the number of chromosome sets, producing cells that are genetically identical to the parent cell
- Meiosis reduces the number of chromosomes sets from two (diploid) to one (haploid), producing cells that differ genetically from each other and from the parent cell
- The mechanism for separating sister chromatids is virtually identical in meiosis II and mitosis

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# Slide 26



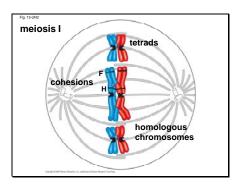
# Slide 27

Three events are unique to meiosis, and all three occur in meiosis I:

Formation of tetrads at the metaphase plate

Synapsis (cohesion) and crossing over amongst 4 sisters

Separation of homologous chromosomes



#### Slide 29

# Remember Our Key Concept:

- Much of our inheritable variation results from changes to the parent's DNA that occur during meiosis
- These changes occur in both parents and are then combined at fertilization to create most of the variation that arises in each generation

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# Slide 30

# Concept 13.4: Genetic variation produced in sexual life cycles contributes to evolution

- Mutations (changes in an organism's DNA) are the primary source of genetic diversity
- Mutations create different versions of genes called <u>alleles</u> (which reside on homologous chromosomes)
- Reshuffling of alleles during sexual reproduction produces genetic variation

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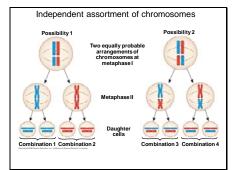
#### Origins of Genetic Variation Among Offspring

Three mechanisms contribute to genetic variation:

- Independent assortment of chromosomes
- Crossing over
- Random fertilization

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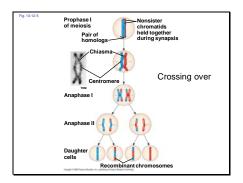
# Slide 32



# Slide 33

#### Independent Assortment of Chromosomes

- Homologous pairs of chromosomes orient randomly at metaphase I of meiosis
- In independent assortment, each pair of chromosomes sorts maternal and paternal homologues into daughter cells independently of the other pairs
- The number of combinations possible when chromosomes assort independently into gametes is  $2^n$ , where n is the haploid number
- For humans (n = 23), there are more than 8 million (2<sup>23</sup>) possible combinations of chromosomes

### Slide 35

#### Crossing Over

- Crossing over produces recombinant chromosomes, which combine genes inherited from each parent
- Crossing over begins very early in prophase I, as homologous chromosomes pair up gene by gene
- In crossing over, homologous portions of two nonsister chromatids trade places
- Crossing over contributes to genetic variation by combining DNA from two parents into a single chromosome

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# Slide 36

### Random Fertilization

- Random fertilization adds to genetic variation because any sperm can fuse with any ovum (unfertilized egg)
- The fusion of two gametes (each with 8.4 million possible chromosome combinations from independent assortment) produces a zygote with any of about 70 trillion diploid combinations


# The Evolutionary Significance of Genetic Variation Within Populations

- Natural selection results in the accumulation of genetic variations favored by the environment
- Sexual reproduction contributes to the genetic variation in a population, which originates from mutations

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