

Chapter 13: Meiosis and Sexual Life Cycles

1. The key features of the two versions of reproduction.

a. Asexual Reproduction _____

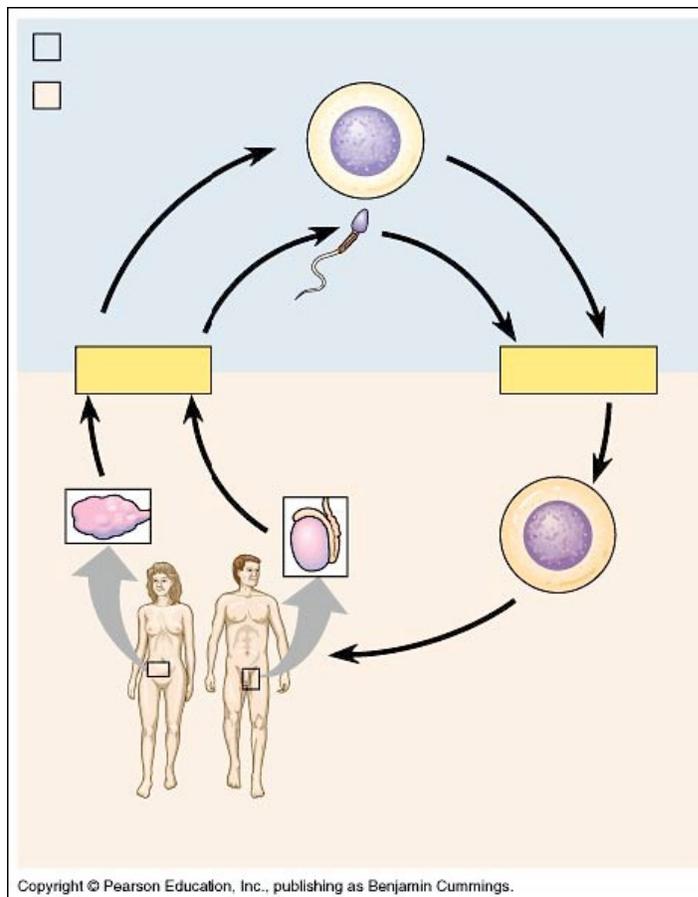
b. Sexual Reproduction _____

2. What is the role of meiosis in sexual reproduction? _____

3. What is a karyotype? _____

4. Identify several things that can be seen with a karyotype? _____

5. Label the diagram of the human lifecycle. Include the chromosome numbers.



6. Compare the products of mitosis with meiosis.

a. Mitosis _____

b. Meiosis _____

7. Meiosis is said to be a double division. Explain. _____

8. Meiosis is an important source of variation. Define and describe how each of the following contributes to variation within a species.

a. Independent Assortment _____

b. Random fertilization _____

c. Crossing Over _____

9. Draw a pair of homologous chromosomes and indicate a crossing over event and the products.

10. List the significant differences between mitosis and meiosis.

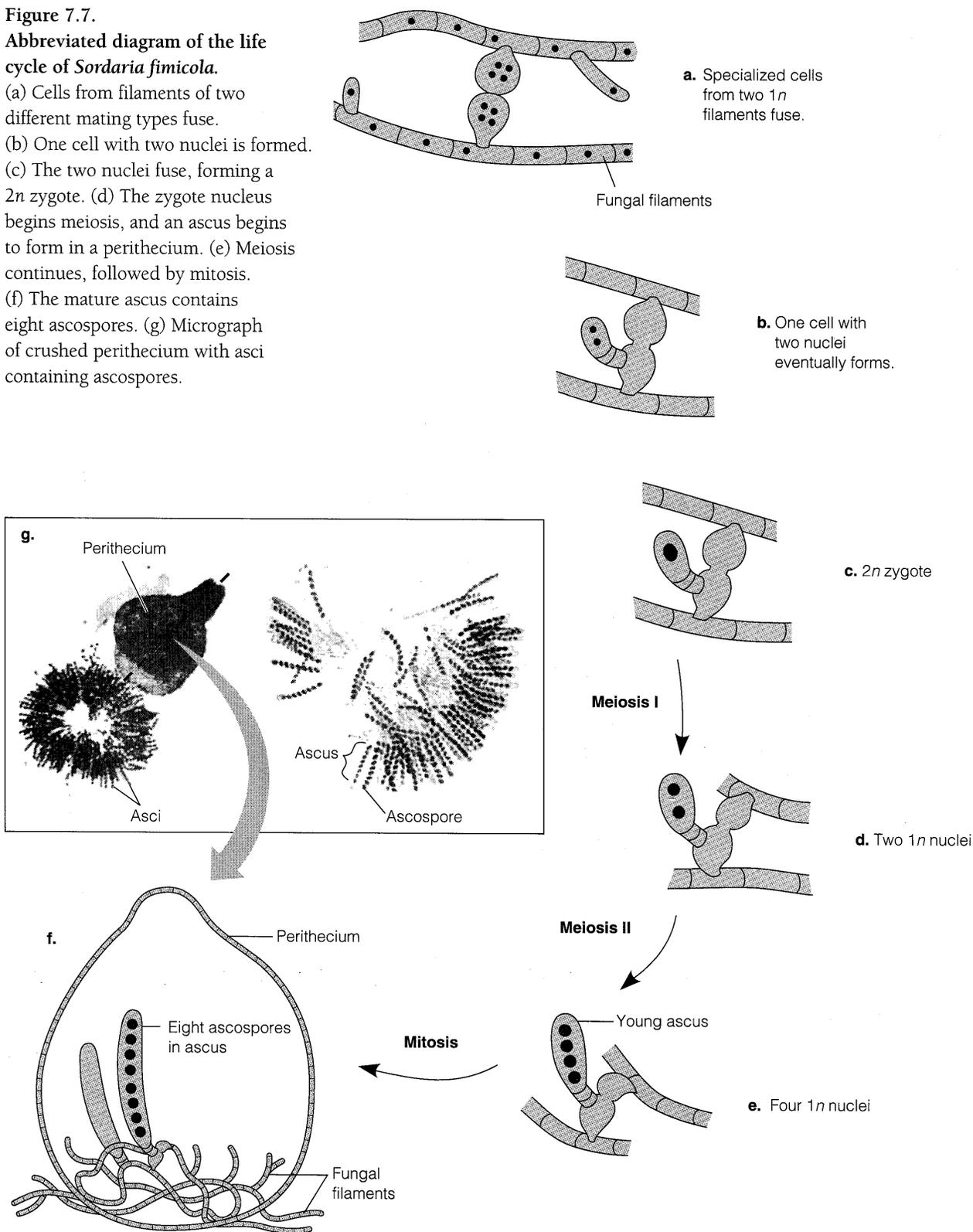
11. What is the significance of genetic variation and natural selection?

12. Here is a picture of the life cycle of *Sordaria*. If parents with different colored spores formed the $2n$ zygote, what would you expect to find in each ascus that resulted? Why are there always 8 ascospores in a mature ascus?

Figure 7.7.

Abbreviated diagram of the life cycle of *Sordaria fimicola*.

- (a) Cells from filaments of two different mating types fuse.
- (b) One cell with two nuclei is formed.
- (c) The two nuclei fuse, forming a $2n$ zygote.
- (d) The zygote nucleus begins meiosis, and an ascus begins to form in a perithecium.
- (e) Meiosis continues, followed by mitosis.
- (f) The mature ascus contains eight ascospores.
- (g) Micrograph of crushed perithecium with asci containing ascospores.

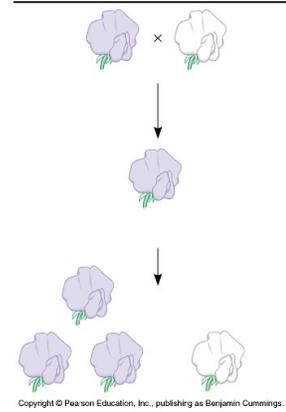


Chapter 14: Mendel and the Gene Idea

1. How does the “blending hypothesis” differ from the “particulate hypothesis” for the transmission of traits? _____

2. List a few of the advantages of Mendel’s choice of the garden pea as a model organism.

3. Use the diagram to label the generations: P, F1, F2, pure, hybrid, and make notes of Mendel’s observations.



4. Define the Law of Segregation. _____

5. Using the diagram in Question 3, describe how the Law of Segregation applies to the F1 and to the F2 generations. _____

6. When does the segregation of alleles occur? _____

7. What is the difference between an allele and a gene?

8. Briefly define the following terms:

a. homozygous _____

b. heterozygous _____

c. phenotype _____

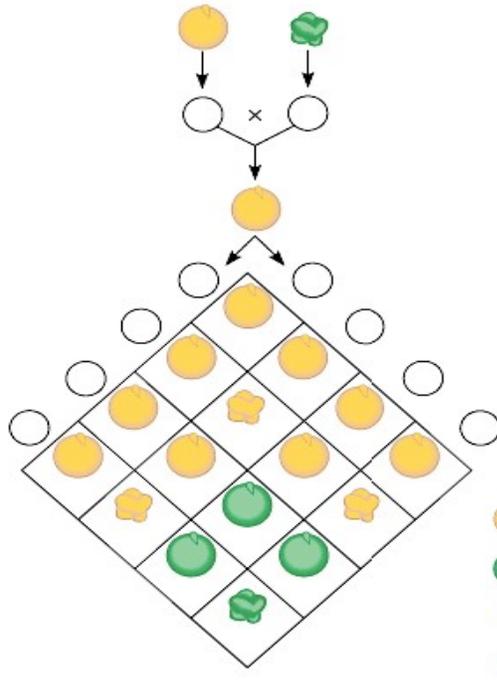
d. genotype _____

9. What is the purpose of a test cross?

10. In seals, the gene for whisker length has two alleles. The dominant allele (W) codes for long whiskers & the recessive allele (w) codes for short whiskers. What percentage of offspring would be expected to have short whiskers from the cross of two long-whiskered seals, one that is homozygous dominant and one that is heterozygous?

11. When two traits are on different (non-homologous) chromosomes, how are they inherited?

a. In pea plants, the yellow color allele (Y) is dominant over green color allele (y) for seed color and round (R) is the dominant allele in seed shape over wrinkled (r). Parents heterozygous for both traits are cross-pollinated. Determine the phenotypic ratios that result in the F2 from this dihybrid cross.



Yellow, round:

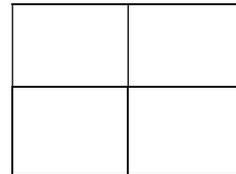
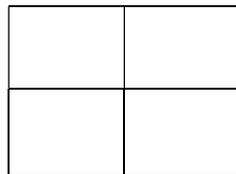
Yellow, wrinkled:

Green, round:

Green wrinkled:

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b. Now, here's a shortcut for solving that same dihybrid cross. Because of Mendel's Law of Independent Assortment, you can work with the color gene and seed shape gene separately... so set up two separate monohybrid crosses from those same parents:



Now use the laws of probability to calculate your frequencies of each trait alone and combined:

	color	shape	= P		color	shape	=P
Yellow, round seeds				Green, round seeds			
Yellow, wrinkled seeds				Green, wrinkled seeds			

c. Use the rules of probability to determine the expected ratio of offspring showing two recessive traits in the trihybrid cross (PpYyRr X Ppyyrr).

12. Describe and give an example of incomplete dominance. _____

13. How does codominance compare to incomplete dominance? _____

14. How is blood type an example of multiple alleles? _____

15. Define and give an example of pleiotropy. _____

16. Define and give an example of epistasis. _____

17. What is observed when traits are polygenic? _____

18. The expression of phenotypes is often a result of both... _____

19. Briefly describe each of the following genetic disorders:

a. Cystic fibrosis _____

b. Tay-Sachs _____

c. Sickle cell anemia _____

d. Achondroplasia _____

e. Huntington's disease _____

20. In radishes, the gene that controls color exhibits incomplete dominance. Pure-breeding red radishes crossed with pure-breeding white radishes make purple radishes. What are the genotypic and phenotypic ratios when you cross a purple radish with a white radish?

21. A man with type AB blood marries a woman with type B blood. Her mother has type O blood. List the expected phenotype and genotype frequencies of their children.

22. Achondroplasia (dwarfism) is caused by a dominant gene. A woman and a man both with dwarfism marry. If homozygous achondroplasia results in death of embryos, list the genotypes and phenotypes of all potential live-birth offspring.

Chapter 15: The Chromosomal Basis of Inheritance

1. Describe some of the pieces of information that scientists discovered that contributed to the "Chromosome Theory of Inheritance"? _____

2. Summarize the Chromosomal Theory of Inheritance. _____

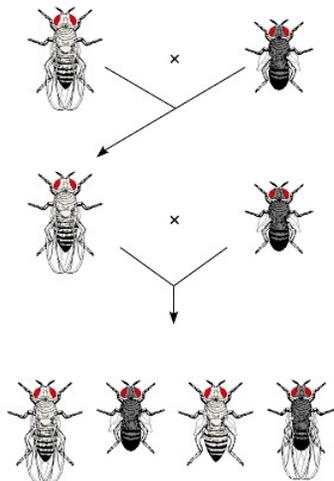
3. Why was Thomas Hunt Morgan's choice of the fruit fly a good model organism?

4. Describe Morgan's first mutant. Why was it so significant from the wild type?

5. Show the cross P, F1, F2 for the white-eyed male mutant.

6. What happens when we trace the inheritance of traits found on the same chromosome?

7. Use the diagram to trace the inheritance of body color and wing shape in this linked two trait cross.



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8. What is recombination and when does it occur? _____

9. How is recombination frequency calculated? _____

10. What determines sex in humans? _____

11. In what ways are sex-linked traits distinct from autosomal traits? _____

12. The genes for hemophilia are located on the X chromosome. It is a recessive disorder. Draw this cross and list the possible genotypes and phenotypes of the children from a man normal from blood clotting and a woman who is a carrier.

13. Why are sex-linked recessive traits more common in human males than females? _____

14. How many X chromosomes are typically expressed in humans and cats? _____

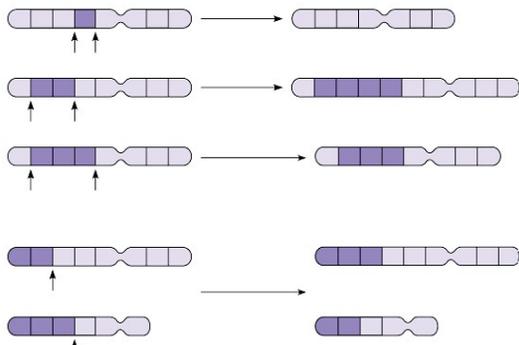
15. What happens to X chromosomes that are inactivated? _____

16. How many Barr bodies would be found in a person with: XXY _____ XO _____ XXX _____.

17. Define each term & indicate when each occurs.
a. aneuploidy _____

b. polyploidy _____

18. Identify each of the alterations of chromosome structure.



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19. List and describe a few specific examples of non-disjunctions that occur in humans.

20. Describe genomic imprinting and give an example. _____
