Chapter 11 Exercises

Review Questions

1. Meiosis usually produces _____ daughter cells.
a. two haploid **b.** two diploid **c.** four haploid **d.** four diploid

2. What structure is most important in forming the tetrads?
a. centromere **c.** chiasma
b. synaptonemal complex **d.** kinetochore

3. At which stage of meiosis are sister chromatids separated from each other?
a. prophase I **b.** prophase II **c.** anaphase I **d.** anaphase II

4. At metaphase I, homologous chromosomes are connected only at what structures?
a. chiasmata **c.** microtubules
b. recombination nodules **d.** kinetochores

5. Which of the following is *not* true in regard to crossover?
a. Spindle microtubules guide the transfer of DNA across the synaptonemal complex.
b. Nonsister chromatids exchange genetic material.
c. Chiasmata are formed.
d. Recombination nodules mark the crossover point.

6. What phase of mitotic interphase is missing from meiotic interkinesis?
a. G_0 phase **b.** G_1 phase **c.** S phase **d.** G_2 phase

7. The part of meiosis that is similar to mitosis is _____.
a. meiosis I **b.** anaphase I **c.** meiosis II **d.** interkinesis

8. If a muscle cell of a typical organism has 32 chromosomes, how many chromosomes will be in a gamete of that same organism?
a. 8 **b.** 16 **c.** 32 **d.** 64

9. Which statement best describes the genetic content of the two daughter cells in prophase II of meiosis?
a. haploid with one copy of each gene **c.** diploid with two copies of each gene
b. haploid with two copies of each gene **d.** diploid with four copies of each gene

10. The pea plants used in Mendel's genetic inheritance studies were diploid, with 14 chromosomes in somatic cells. Assuming no crossing over events occur, how many unique gametes could one pea plant produce?
a. 28 **b.** 128 **c.** 196 **d.** 16,384

11. How do telophase I and telophase II differ during meiosis in animal cells?
a. Cells remain diploid at the end of telophase I but are haploid at the end of telophase II.
b. Daughter cells form a cell plate to divide during telophase I but divide by cytokinesis during telophase II.
c. Cells enter interphase after telophase I but not after telophase II.
d. Chromosomes can remain condensed at the end of telophase I but decondense after telophase II.

12. What is a likely evolutionary advantage of sexual reproduction over asexual reproduction?
a. Sexual reproduction involves fewer steps.
b. There is a lower chance of using up the resources in a given environment.
c. Sexual reproduction results in variation in the offspring.
d. Sexual reproduction is more cost-effective.

13. Which type of life cycle has both a haploid and diploid multicellular stage?
a. asexual life cycles **c.** most fungal life cycles
b. most animal life cycles **d.** alternation of generations

14. What is the ploidy of the most conspicuous form of most fungi?

a. diploid
b. haploid
c. alternation of generations
d. asexual

15. A diploid, multicellular life-cycle stage that gives rise to haploid cells by meiosis is called a _____.

a. sporophyte **b.** gametophyte **c.** spore **d.** gamete

16. Suppose hydras and jellyfish both live in a freshwater lake that is slowly being acidified by the runoff from a chemical plant built upstream. Which population is predicted to be better able to cope with the changing environment?

a. jellyfish
b. hydra
c. The populations will be equally able to cope.
d. Both populations will die.

17. Many farmers are worried about the decreasing genetic diversity of plants associated with generations of artificial selection and inbreeding. Why is limiting random sexual reproduction of food crops concerning?

a. Mutations during asexual reproduction decrease plant fitness.
b. Consumers do not trust identical-appearing produce.
c. Larger portions of the plant populations are susceptible to the same diseases.
d. Spores are not viable in an agricultural setting.

Critical Thinking Questions

18. Describe the process that results in the formation of a tetrad.

19. Explain how the random alignment of homologous chromosomes during metaphase I contributes to the variation in gametes produced by meiosis.

20. What is the function of the fused kinetochore found on sister chromatids in prometaphase I?

21. In a comparison of the stages of meiosis to the stages of mitosis, which stages are unique to meiosis and which stages have the same events in both meiosis and mitosis?

22. Why would an individual with a mutation that prevented the formation of recombination nodules be considered less fit than other members of its species?

23. Does crossing over occur during prophase II? From an evolutionary perspective, why is this advantageous?

24. List and briefly describe the three processes that lead to variation in offspring with the same parents.

25. Animals and plants both have diploid and haploid cells. How does the animal life cycle differ from the alternation of generations exhibited by plants?

26. Explain why sexual reproduction is beneficial to a population but can be detrimental to an individual offspring.

27. How does the role of meiosis in gamete production differ between organisms with a diploid-dominant life cycle and organisms with an alternation of generations life cycle?

28. How do organisms with haploid-dominant life cycles ensure continued genetic diversification in offspring without using a meiotic process to make gametes?