



Meiosis

Figure 4

Spermatogenesis

The process of forming heterogametes in the human male is called spermatogenesis, and the resulting four cells are given the special name spermatids. Spermatids are quiescent until they grow flagellar "tails" to propel themselves through liquid. They are then called spermatozoa, or sperm cells, and in man they may live on stored cytoplasmic energy for from twelve to twenty-four hours. During this brief period they might succeed in swimming to and fertilizing an egg. If the fertilized egg fully develops, the result is a genetically unique, diploid individual.

Oogenesis

In a human female, the process of meiosis is called oogenesis, and because cellular division is unequal, only one haploid egg results. Nuclear material appears to be evenly divided between the four daughter cells, but during both anaphases I and II and telophases I and II, cytoplasmic division is unequal. The bulk of the cytoplasmic material stays with one large cell, the egg (known as an ootid in its early stages), with the three much smaller cells known as polar bodies. Polar bodies disappear rapidly, apparently being reabsorbed. The egg may live an independent, unfertilized life for perhaps two days before its cytoplasmic energy is exhausted.

Reproduction Puzzle Review

13. Review the terms and concepts you have learned in this exercise, as well as in exercise thirteen, by finding key words in the puzzle, figure five below. The words are written either vertically or horizontally. Circle the words. If you have trouble finding all the words, question fourteen will help you plug the gaps.

Mitosis/Meiosis Puzzle

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
20	C	Y	T	O	S	I	N	E	S	Y	N	A	P	S	I	S	S	G	M	H
21	H	A	I	N	R	T	R	N	O	T	E	T	R	A	D	M	A	U	E	
22	R	U	S	P	E	R	M	A	T	O	G	E	N	E	S	I	S	T	L	
23	O	D	N	A	P	L	E	N	H	V	O	N	A	S	T	E	R	A	I	
24	M	H	A	P	L	O	I	D	Y	A	N	A	P	H	A	S	E	T	X	
25	O	O	D	R	I	D	O	M	M	I	T	O	S	I	S	I	I	I	T	
26	S	M	E	O	C	I	S	P	I	N	D	L	E	R	A	Y	S	O	T	
27	O	O	N	P	A	P	I	I	N	T	E	R	P	H	A	S	E	N	E	
28	M	L	I	H	T	L	S	G	E	N	E	S	H	A	L	U	C	F	L	
29	E	O	N	A	I	O	I	A	P	O	L	A	R	B	O	D	Y	U	O	
30	N	G	E	S	O	I	O	M	W	A	T	S	O	N	G	E	N	R	P	
31	S	U	N	E	N	D	C	E	N	T	R	O	M	E	R	E	D	R	H	
32	R	E	O	P	L	M	E	T	A	P	H	A	S	E	O	W	X	O	A	
33	N	R	P	U	R	I	N	E	S	P	E	R	M	A	B	L	A	W	A	
34	C	E	N	T	R	O	S	O	M	E	C	E	L	L	P	L	A	T	E	

Figure 5

Key:

14. Fill in the following blanks. You will find the first letter of the word that completes each sentence in the figure five puzzle, according to a row or column number given to the right of the blank.

- A. The substance that makes up chromosomes is _____ 2.
- B. The production of sperm is called _____ 3.
- C. A specialized type of cell division that results in the formation of haploid gametes is called _____ 22.
- D. A cell which contains a reduced number of chromosomes is said to be _____ 2.
- E. Female gametes result from _____ 22.
- F. The nitrogen base that complements adenine is _____ 9.
- G. The type of cell division that insures the exact genetic makeup of the chromosome is _____ 9.
- H. During this phase chromosomes migrate to the poles: _____ 10.
- I. During interphase, DNA is undergoing _____ 21 to produce an exact duplicate of itself.
- J. A single chromosome of a homologous pair is called a _____ 24.
- K. _____ 23 transfers messages from DNA during protein synthesis.
- L. The _____ 13 consists of the astral rays and the centrosome.
- M. The _____ 7 extends from pole to pole and develops during prophase as the centrioles move apart.
- N. _____ 8 are found on the chromosomes.
- O. A sex cell is known as a _____ 28.
- P. During _____ 6 chromosomes align at the equatorial plate.
- Q. The nitrogen base that complements thymine is _____ 24.
- R. The growth and maintenance stage of the cell is called _____ 27.
- S. A synapsed pair of chromosomes forms a _____ 10.
- T. The longest phase of mitosis is _____ 24.
- U. The point of attachment for the chromatid is the _____ 7.
- V. A cell that contains the normal set of chromosomes is said to be _____ 25.
- W. An ootid and _____ 9 develop from unequal division during oogenesis.
- X. The process wherein two homologous pairs of chromosomes become attracted and entwined is called _____ 20.

- Y. Guanine is an example of a _____ 3.
- Z. Man contains twenty-three pairs of _____ 20.
- AA. One of the men who discovered the structure of the DNA molecule was _____ 9.
- BB. The nitrogen base that complements guanine is _____ 1.
- CC. The male gamete is called the _____ 9.
- DD. The dark region of cytoplasm just outside the nucleus is the _____ 1.
- EE. During mitosis a _____ 11 forms in the plant, whereas in animals a _____ 28 forms.
- FF. The DNA molecule is sometimes called a double _____ 20.
- GG. The last phase of mitosis is _____ 26.

Resources

- Carolina Biological. *Cell Division – Mitosis and Cytokinesis*. Filmstrip 52-1640, or slide set 48-1133 with cassette, 1985.
- Educational Images. *Mitosis*. C 3025, computer disk for the Apple series, with interactive quiz package guide and back-up disk, 1984.
- Encyclopedia Britannica Films. "Mitosis," #1902. "Meiosis: Sex Cell Formation," #2021, in the *Heredity and Adaptive Change* film series.
- Kenkel, Leonard A. "Teaching Mitosis with Playing Cards," *The Science Teacher*, 47(6), 1980.
- Sundberg, Marshall, D. "Making the Most of Onion Root Tip Mitosis," *The American Biology Teacher*, 43(7), 1981.

Terminology

Students should understand the following terms and concepts prior to taking the unit review:

anaphase
egg
heterogamete
interkinesis

interphase
isogamete
metaphase
oogenesis

ootid
prophase
sperm

spermatid
spermatogenesis
telophase