

Mader/*Biology*, 11/e – Chapter Outline

Chapter 10

10.5 The Cycle of Life

1. **Life cycle** refers to all reproductive events between one generation and next.
2. In animals, the adult is always diploid [Instructors note: some bees, etc., have haploid male adults].
3. In plants, there are two adult stages: one is diploid (called the **sporophyte**) and one is haploid (called the **gametophyte**).
4. Mosses are haploid most of their cycle; the majority of higher plants are diploid most of their cycle.
5. In fungi and some algae, only the zygote is diploid, and it undergoes meiosis.
6. In human males, meiosis is part of **spermatogenesis** (the production of sperm), and occurs in the testes.
7. In human females, meiosis is part of **oogenesis** (the production of eggs), and occurs in the ovaries.
8. After birth, mitotic cell division is involved in growth and tissue regeneration of somatic tissue.

A. Spermatogenesis and Oogenesis in Humans

1. Spermatogenesis
 - a. In the testes of males, primary spermatocytes with 46 chromosomes undergo meiosis I to form two secondary spermatocytes, each with 23 duplicated chromosomes.
 - b. Secondary spermatocytes divide (meiosis II) to produce four spermatids, also with 23 daughter chromosomes.
 - c. Spermatids then differentiate into sperm (spermatozoa).
 - d. Meiotic cell division in males always results in four cells that become sperm.
2. Oogenesis
 - a. In the ovaries of human females, primary oocytes with 46 chromosomes undergo meiosis I to form two cells, each with 23 duplicated chromosomes.
 - b. One of the cells, a **secondary oocyte**, receives almost all the cytoplasm; the other cell, a **polar body**, disintegrates or divides again.
 - c. The secondary oocyte begins meiosis II and then stops at metaphase II.
 - d. At ovulation, the secondary oocyte leaves the ovary and enters an oviduct where it may meet a sperm.
 - e. If a sperm enters secondary oocyte, the oocyte is activated to continue meiosis II to completion; the result is a mature egg and another polar body, each with 23 daughter chromosomes.
 - f. Meiosis produces one egg and three polar bodies; polar bodies serve to discard unnecessary chromosomes and retain most of the cytoplasm in the egg.
 - g. The cytoplasm serves as a source of nutrients for the developing embryo.