SUMMARY OF CHAPTER 5

THE HUMAN ORGANISM AND THE PERPETUATION OF LIFE

1. THE CELL

- Cells are the basic structure of all living beings. The cell is the basic unit of life (p. 126).
- An optical microscope allows the distinguishing of three cell components: the cell membrane (a flexible barrier that surrounds the cell content), the cytoplasm (the gelatinous fluid inside the cell membrane) and the nucleus (which contains DNA) (p.126).
- DNA is a long molecule shaped like a double helix. It provides the cell with the instructions it needs to carry out its functions and specify an individual's traits (p. 128).
- The sequencing of base pairs along the DNA molecule makes up the genome. The human genome consists of about three billion base pairs (p. 128).
- A gene is a segment of DNA. Humans have about 25 000 different genes (p. 129).
- Each individual receives genes from his or her father and mother. Each person is therefore a unique combination of the traits of his or her parents (p. 129).
- The greater the number of individuals in a population, the greater the genetic diversity. A small or isolated population is more likely to be less genetically diverse (p. 130).

2. CELL DIVISION

- Cell division occurs for three reasons: to allow the organism to grow, to regenerate damaged tissue or to make sexual reproduction possible (p. 131).
- As a cell prepares to divide, it duplicates the DNA in its nucleus. Two helixes identical to the original DNA helix are formed (p. 132).
- As cell division begins, the DNA strands coil and condense, forming pairs of chromosomes. Humans have 23 pairs of chromosomes (pp. 132–133).
- Mitosis is a process of cell division in which cells multiply in order to ensure growth and tissue repair (p. 133).
- At the end of mitosis, the two daughter cells possess the same genetic material as the parent cell (p. 133).
- The purpose of meiosis is sexual reproduction (p. 135).
- At the end of meiosis, the four daughter cells possess only half of the genetic material of the parent cell, or 23 chromosomes instead of 23 pairs of chromosomes (p. 135).

3. CELLULAR SPECIALIZATION

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- Following fertilization, cells specialize as well as multiply (p. 136).
- A group of cells with the same structure and function form tissue. There are four types of tissue: epithelial, connective, muscle and nerve (p. 136).
- A structure composed of two more tissue types grouped together to perform a specific function is an organ (p. 138).
- Organs that work together for a common purpose make up a system (p. 139).
- Organ systems together make up an organism, or living body (p. 139).

4. THE REPRODUCTIVE SYSTEM

- Fertilization is the fusion of an ovum and a spermatozoan, which produces a cell with a full complement of chromosomes, a zygote (p. 140).
- Meiosis and fertilization represent the first two stages of the cycle of sexual development (p. 140).
- Puberty occurs during adolescence. It is the set of changes that prepare the human body for the ability to reproduce (p. 141).
- Puberty is triggered by two hormones secreted by the pituitary gland: FSH and

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LH. These hormones stimulate the maturation of ova (in females) and the production of spermatozoa (in males). FSH and LH also stimulate the ovaries and the testicles to produce sex hormones (p. 141).

- The primary sex hormones produced by the ovaries are estrogens and progesterone. The primary sex hormone produced by the testicles is testosterone. These hormones are responsible for the initiation of primary and secondary sexual characteristics (p. 141).
- Oogenesis is the process of ovum production by meiosis (p. 144).
- The ovarian cycle is the maturation process of a single ovarian follicle during oogenesis (p. 145).
- The menstrual cycle represents all of the periodic changes in the uterine endometrium (p. 147).
- Oogenesis, the ovarian cycle and the menstrual cycle are controlled by FSH, LH, estrogens and progesterone (p. 148).
- Around the age of 50, women begin menopause. The ovaries gradually stop producing ova and sex hormones (p. 148).
- Spermatogenesis is the process of sperm production. It is FSH that controls this process (p. 149).
- Erection and ejaculation are both necessary for the expulsion of semen, a liquid that contains sperm (p. 150).
- When men get older, they experience andropause. The symptoms of andropause are not as clearly defined as the symptoms of menopause (p. 150).
- Understanding of the reproductive system, the role of hormones and the process leading up to the establishment of the zygote in the uterus has enabled scientists to develop various methods of contraception with varying rates of effectiveness (p. 151).

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