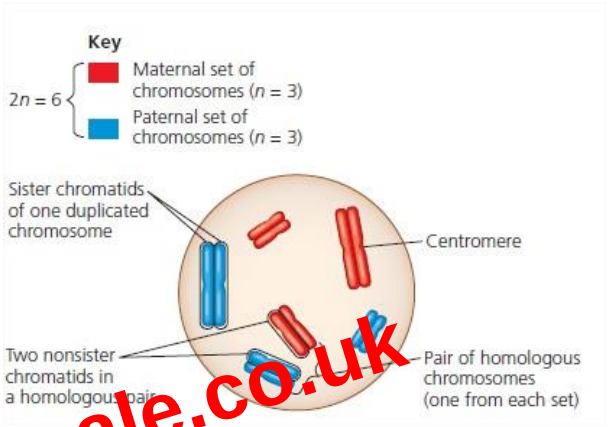
Chapter 10 Meiosis and Sexual Life Cycles

☙ **Heredity:** the transmission of traits from one generation to the next ☙ **Variation:** any difference between cells, individual organisms, or groups of organisms of any species caused by either genotypic variation or phenotypic variation ☙ **Genetics:** the scientific study of heredity and hereditary variation ☙

10.1 Offspring acquire genes from parents by inheriting chromosomes

Inheritance of Genes

☙ Each **gene** in an organism's DNA exists at a specific locus on a certain chromosome ☙ **Genes:** a discrete unit of hereditary information consisting of a specific nucleotide sequence in DNA ☙ **Gametes:** a haploid reproductive cell (egg or sperm) ☙ **Somatic Cells:** any cell other than a gamete (egg or sperm) ☙ **Locus**



Comparison of Asexual and Sexual Reproduction

☙ In **asexual reproduction**, a single parent produces genetically identical offspring by mitosis. **Sexual Reproduction** combines genes from two parents, leading to genetically diverse offspring ☙ **Asexual Reproduction:** a form of reproduction that does not involve meiosis, ploidy reduction, or fertilization, and the offspring is an organism – no exchange of genetic material ☙ **Clone:** a group of genetically identical individuals ☙ **Sexual Reproduction:** two parents give rise to offspring that have unique combinations of genes inherited from the two parents ☙

10.2 Fertilization and meiosis alternate in sexual life cycles

☙ **Life cycle:** the generation to generation sequence of stages in the reproductive history of an organism, from conception to production of its own offspring.

Sets of Chromosomes in Human Cells

☙ Normal human **somatic cells** are diploid. They have 46 chromosomes made up of two sets of 23 chromosomes, one set from each parent. Human diploid cells have 22 homologous pairs of autosomes and one pair of **sex chromosomes**; the latter determines whether the person is female (XX) or male (XY). ☙ **Karyotype:** the number, size, and shape of chromosomes in an organism ☙ **homologous chromosomes (homologs):** chromosome pairs, one from each parent, that are similar in length, gene position, and centromere location ☙ **sex:** X and Y chromosomes, gender ☙ **autosome chromosomes:** all chromosomes except sex chromosomes ☙ **diploid cell:** any cell with two chromosome sets ☙ **haploid cell:** a single set of chromosomes ☙

Behavior of Chromosome Sets in the Human Life Cycle

☙In humans, ovaries and testes produce **haploid gametes** by **meiosis**, each gamete containing a single set of 23 chromosome (n=23). During **fertilization,** an egg and a sperm unite, forming a diploid (2n=46) single-celled **zygote,** which develops into a multicellular organism by mitosis ☙ **Fertilization:** the union of gametes, culminating in fusion of their nuclei ☙ **Zygote:** fertilized egg ☙ **meiosis:** gamete formation, cell division ☙

The Variety of Sexual Life Cycles

☙ Sexual **life cycles** differ in the timing of meiosis relative to fertilization and in the point(s) of the cycle at which a multicellular organism is produced by mitosis ☙ **Alternation of generations:** alternation of a sexual phase (gametophyte) and a nonsexual phase (sporophyte) in the life cycle of an organism ☙